

# AUTOMOTIVE INDUSTRIES

VOLUME 65

JULY 4, 1931

NUMBER 1

## Business Accelerated as Moratorium Plans Quicken Recovery Tempo

by Leslie Peat

Second quarter sales offset poor showing at first of year + + + +

**M**ANY definite proofs of world economic gains during the first half of this year indicate that the second half will emerge from the trough of the present long depression.

Perhaps no news in recent years has been received with such universal acclaim as President Hoover's proposal for a debt and reparation moratorium. This plan must first be enacted into law by the Congress, but it would seem from last-minute dispatches that leaders of both major parties favor a special session to perform quickly the legislative functions which are required.

European commodity and securities markets responded almost immediately to the news of the proposal, with material strengthening to prices and increased volume of transactions.

The influence of the spirit of economic revival is beginning to be felt in retail business, and automobile dealers throughout the country are beginning to see results of this new optimism. Unless some serious handicap is encountered, sales should hold up well.

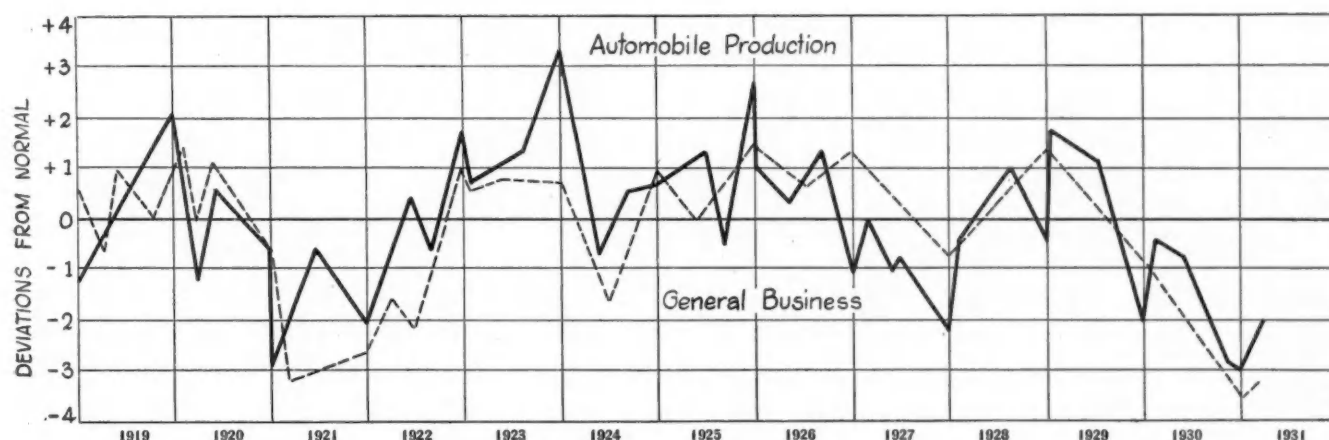
Although new car sales were off by 27 per cent during the first six months, the trend since May has been better than either the 1930 curve or the average trend for the five-year period of from 1926 to 1930, inclusive. Domestic new motor vehicle registrations for the first half were approximately 1,400,000, as compared with 1,934,481 for the first half of 1930.

Domestic sales were off about 32 per cent for the first quarter, as compared with the same period last year, but were off only 22 per cent for the second quarter, as compared with the second quarter of 1930.

June's showing was the best of the year, with only about 12 per cent decline from the June, 1930, new motor vehicle sales figure. March, April and June each showed substantial improvement over the preceding months of this year.

Although the estimated new and used car stocks on hand are high, they are not excessively so as compared

Automotive record shows strong influence toward early recovery of general business activity + + + +



The automotive industry has clearly led business to recovery several times during past depressions, as can be seen above + + + +

Ford's being out of production in 1926 and 1927 had a heavy bearing on automobile production, as is seen by this chart + + + +

The early upswing in automobile production this year was followed by the general business activity recovery (dotted line) + + + +

with other periods and are well under the peaks of 1930.

Manufacturers and wholesalers in the parts and equipment business, too, have found the upturn begun early this year continuing. May business held even with April business instead of suffering the usual seasonal slump in this period.

The Motor & Equipment Association index for the whole industry (based on January, 1926, as 100) was 124 for both April and May, as compared with 144 for May, 1930, and 163, April, 1930.

Both original equipment and service parts showed increases for May, but accessories and service equipment showed declines.

Eight out of 17 stocks of automotive companies have maintained higher market prices during the recent period of low prices than they did during the 1920-21 depression, according to compilation just prepared by Frazier-Jelke Co., New York bankers. Allowance is made in this compilation for stock split-ups and stock dividends made during the intervening period. Companies maintaining a higher level during the recent low point than they registered in 1920 and 1921, are: General Motors, Mack Trucks, Motor Wheel, Packard, Reo, Spicer Mfg. Co., Studebaker Corp. and Timken Roller Bearing Co.

Now that the eyes of the commercial world are turned toward the automotive industry for leadership out of the morass of depression, it is particularly gratifying to note the favorable influence of this industry, as plotted with the general business activity curve.

As will be seen from the chart on the preceding page, the automobile business has lagged behind general business activity in declines and has led the general business curve back to periods of recovery, generally speaking.

The motor industry has been comparatively stable, despite the magnitude of seasonal variations in production and sales.

The chart on preceding page shows that:

1. Since last November, while general business has continued its fall to new lows, the automobile business has recouped some of its losses and is leading the way to recovery.
2. The rate of car and truck production did not fall as low during the present depression as it did during the slump of 1921.
3. The decline of automotive business from the peak of 1929 was less severe than the decline of general business at the turning point of prosperity.
4. The recovery of automobile business in the early months of 1930 was much sharper, and rose to higher levels than did the curve of general business conditions.

No one will venture to prophesy whether the past and present leadership demonstrated by the motor car industry will continue during the summer months ahead. Naturally, the automotive business cannot show gains unless general business continues the upswing begun during last half of the first quarter of this year. General business must show a strong recovery before prospective car buyers begin to spend money.

But the fact that stabilization has been reached in this industry, as pointed out from time to time in these pages, induces the belief that trends of automotive production will fit closer and closer the trends of general business activity in this country as time goes on.

The degree to which the automobile has ceased to be a luxury and has become a necessity today, determines to a great extent the stabilization of the industry.

Now, with a rapidly increasing number of cars and trucks being scrapped each year, the replacement sales figure assumes more and more importance. Since car owners need their automobiles as much as other manufactured products which must be replaced, the number of motor vehicles scrapped annually is tantamount to new car sales.

The relationship of the automobile industry and general business is far closer than heretofore, because of the magnitude of its operation. Its demand for raw materials, fabricated steel and other materials, finished parts and accessories is tremendous. Few industries furnish as large a market in so wide a range of supplier markets as does the motor vehicle industry. Now that cars and trucks have become such an integral part of our civilization, these supplier industries may and do expect a continued lively market in the sale of new motor vehicles.

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## President Hoover—

**I**F, as many believe, we have passed the worst of this storm, future months will not be difficult.

If we shall be called upon to endure more of this period, we must gird ourselves to steadfast effort . . . .

We plan to take care of 20 million increase in population in the next 20 years.

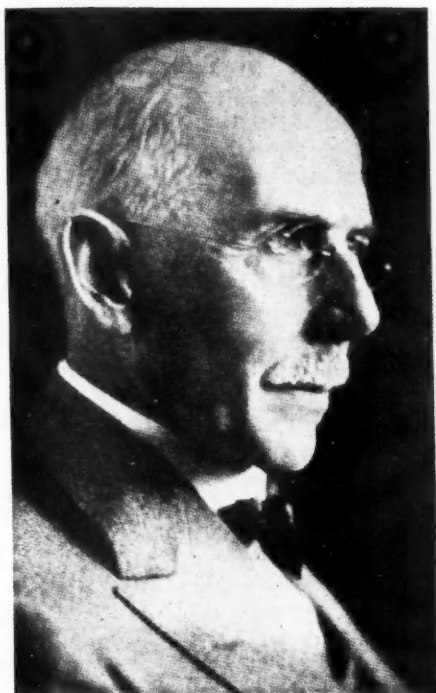
We plan to build for them 4 million new and better homes, thousands of new and still more beautiful city buildings, thousands of factories; to increase the capacity of our railways; to add thousands of miles to our highways and waterways; to install 25 million electrical horsepower; to grow 20 per cent more farm products . . . .

We shall, by scientific research and invention, lift the standard of living and security of life to the whole people.

And this plan will be carried out if we just keep on giving the American people a chance . . . They have already done a better job for 120 million people than any other nation in all history.—President Hoover, in a recent address before Indiana newspaper editors.

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# GOOD WILL TURNS THE TIDE



FOR more than a week the world has been exposing itself to the contagion of good will. That right-about-face in thought and feeling is today the most dynamic and significant factor in the business outlook both at home and abroad.

President Hoover's debt proposal has produced effects that are without a parallel since international relations began. For months men in every land have been looking for the first sign of a turn toward better things. In our own country it has been loudly complained that we had neither leadership nor plan.

In a single week-end hour at Washington both leader and plan suddenly appeared, and in the same hour the leader applied the power that was to make the plan effective. What was the power? Simply the age-old impulse of Good Will.

More than any other factor, ill-will—between nations, between political partisans, between business competitors—has been outstanding in this depression. None that preceded it has been marked by such intense expressions of bitterness. Statesmen in one nation charging responsibility upon those in another; political spokesmen arraigning opposition party leaders; publicists and economists assailing legislative and administrative policies and excoriating those in authority for failure to find the way out; business men using unethical methods to wrest orders

by A. I. Findley

for 25 years editor, and at present editor emeritus of The Iron Age and a director of United Business Publishers, Inc.

from competitors—such has been the sorry record of the past two years.

Meanwhile, men have been talking about a future war as one that might end civilization, little realizing that so much ill will was abroad—between nations, and between parties and interests in the same nation—as actually to create a worldwide state of war.

And now the world is under the spell of a new spirit. Never has there been such worldwide accord on any matter affected with an international interest. The good will that went out from Washington has been answered by good will from every corner of the globe. A great incubus has been lifted from international relations, from business between nations, from domestic business in every land.

No, the animosities have not been healed and the economic millennium has not dawned. All the distress of an unparalleled depression is still with us. But we have had a week crowded as no other has ever been with worldwide approval of a great message of good will, and the right solution of our vexing problems has thus been advanced immeasurably. Outweighing all other gains from the President's proposal are those that will flow from its sheer friendliness.

In all the experiences of American business men through these trying months, beginning with the crash of 1929, too much of our thinking and planning has been in material and mechanical terms—in the language of charts and cycles and of this and that barometer of trade—so much so that the well being of our people has been treated as a product of mechanization along with the rest. Too little have we thought of its moral side, even in the face of well defined factors of deterioration in civic life, in business, and in community and home standards.

How fast we come up out of the slough will depend more on the rate of repair of the moral factors than of those which lie in the domain of politics and economics.

Thus, in setting in motion a wave of good will that has generated courage, confidence and hope, President Hoover has been of incalculable help in putting his own country and all the world on the road back to better times.

Whatever the minor fluctuations in the few months just ahead, his act splendidly marks the turning of the tide. Let his countrymen give themselves with a new resolve to the high enterprise of increasing the store of good will—internationally, politically, at home, in business with the world, and in business with one another.



# Detonation Theory Confirmed by Combustion Within a Cylinder

Special combustion camera and test cylinder shows that detonation is due to spontaneous ignition of that part of the fuel charge farthest from the spark plug + + +

**D**ETONATION, its causes and control, long the subject of dispute, has now been photographically recorded and studied. Lloyd Withrow and T. A. Boyd of the General Motors Research Laboratories evolved an apparatus and methods by which what virtually amounts to moving-picture records of combustion have been obtained, synchronized with a record of pressure changes within the cylinder.

From the results of these studies Messrs. Withrow and Boyd have drawn the following conclusions:

1. Starting at the spark plug, a flame moves progressively through the fuel charge in the chamber in the form of a narrow combustion zone, within which burning of the charge is complete.

2. During normal combustion (non-knocking) the time required for the flame to travel across the combustion space (under the conditions of the tests) corresponded to about 40 deg. of crankshaft revolution, the time in degrees of crankshaft revolution being not greatly affected by engine speed over the range covered in the tests.

3. A knocking explosion differs from a non-knocking one only in the way the last portion of the charge burns. The difference is that whereas in normal combustion the flame travels at a comparatively constant velocity clear across the combustion chamber, in a "knocking explosion" the rate of flame travel is much above normal during the last part of combustion. In fact, the rate is often so high that the flame appears simultaneously throughout the whole of that portion of the charge which is still unburned.

4. The extremely high rate of inflammation of that last portion of the charge which burns at the instant of knock, is apparently due to auto-ignition, or spontaneous ignition occurring within it. This may be caused by high temperature induced within that part of the charge by adiabatic compression due to expansion of the gases already burned.

5. The violence of the knock depends on how large a portion of the total charge is involved in the spontaneous inflammation, or the amount of the total charge still remaining to be burned at

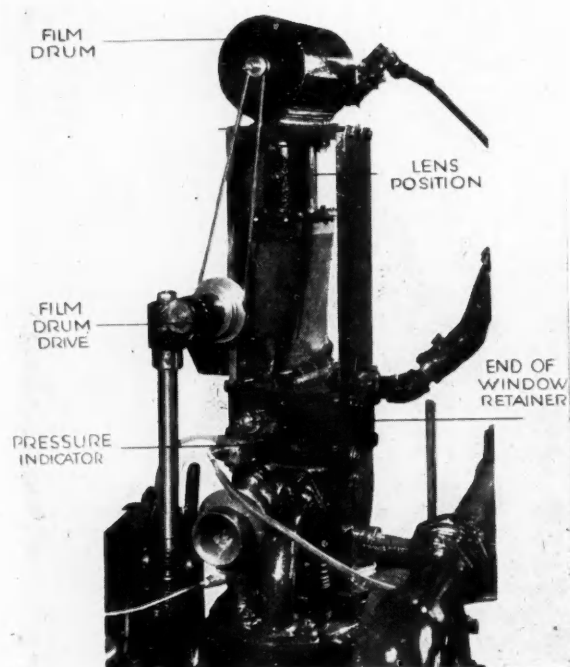


Fig 1 (above) — Photograph of combustion camera mounted on engine + + + + +

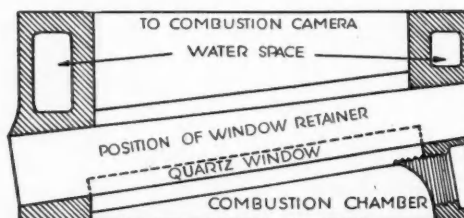
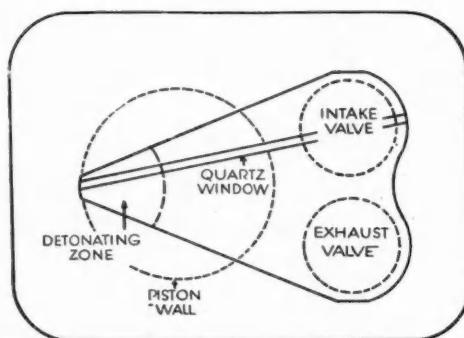


Fig. 2 (left)—Two views of the cylinder head which show the location of the quartz window and the general shape of the combustion chamber + +

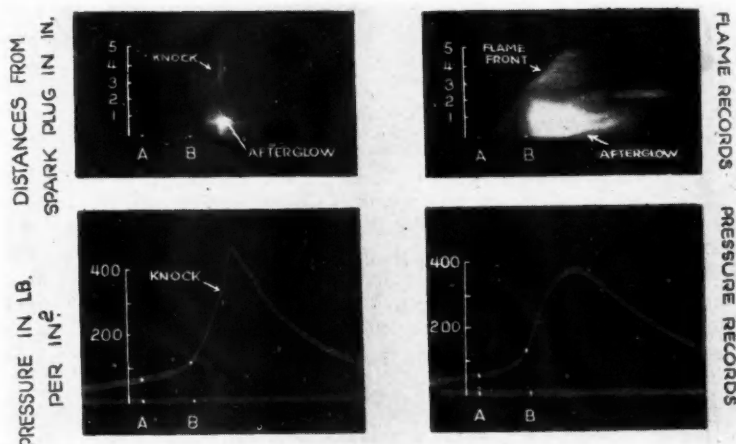


# Picture Records of

by

Athel F. Denham

Fig. 3 (below)—Knock shown by flame-travel and pressure records. The records on the left were taken when the engine was running on gasoline and was knocking, while those on the right were taken when running on benzene without knock. In the diagrams (Fig. 3, 4, 5) the distance A-B corresponds to 20 deg. of crank motion, irrespective of slight differences in the actual distance resulting from photographic reduction, as seen here + +



the instant knock occurs.

6. A rapid rise in cylinder pressure occurs at the instant of knock. The magnitude of this pressure rise increases with the intensity of the knock.

7. Lead tetraethyl (Ethyl fluid) in the gasoline has the effect, apparently, of preventing rapid inflammation of the last portion of the charge and the accompanying pressure rise, which is the knock. Lead tetraethyl appears to have no appreciable effect upon the velocity or the character of the flame prior to the time at which knock would have occurred in its absence.

The apparatus by means of which the motion photographs and pressure records were obtained is shown in Fig. 1. It consists of a single-cylinder L-head engine having a quartz window in the combustion chamber, above which window is mounted a camera. The location of the quartz window is shown in Fig. 2. It was cemented into a tapered plug of invar steel which was ground to fit a hole drilled through the cylinder head, and was held in place by a nut and washer. This construction was used to permit cleaning of the window.

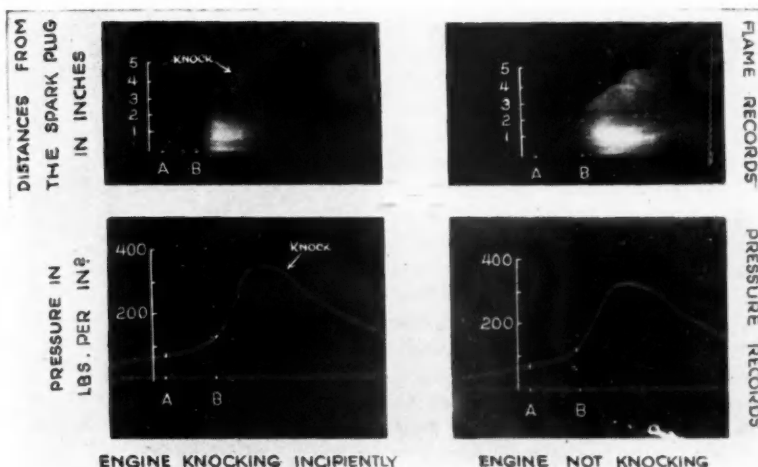


Fig. 4 (above)—Records showing the effect of lead tetraethyl on combustion. The records on the left were taken when running with the same gasoline as used for the left-hand record in Fig. 3, but with an addition of 2.5 cc. of lead tetraethyl, while the records on the right were taken with 5 cc. of tetraethyl per gallon of the gasoline + + + + +

Above the window was located a fast lens mounted inside a cylindrical tube. This focused the light emitted through the window upon the surface of a photographic film fastened around a rotating cylinder or film drum inside the cylindrical can near the top of the photograph. The drum was rotated by means of a drive connection from the camshaft in the engine. The direction of film rotation was at right angles to the axis of the window.

A spark-plug type of pressure indicator was so located that the terminals of the plug were visible through the quartz window. With this apparatus actual photographs of the ignition sparks were obtained on the flame pictures. For the purpose of accurately timing the record of events on the film the ignition system was so constructed that an extra spark occurred 20 deg. of revolution after the regular ignition spark. This extra spark also showed on the films, thereby providing a time scale record on the photograph.

By connecting the primary of the ignition system in series with the primary of a tiny transformer, the secondary of which was included in the oscillograph circuit, the two instants, 20 deg. apart, when the two sparks occurred 20 deg. of revolution after the regular in the form of "kinks" in the light trace.

Referring further to Fig. 2, the spark plug was located over the intake valve to avoid the disturbing effect of hot spots, such as the exhaust valve. In order to be able to carry out the work, of course, it was necessary to make the shape of the combustion chamber considerably different from the conventional

shapes now in commercial use. For instance, it was necessary that the spark plug terminals should be visible from the top, through the window.

With this construction, the last part of the charge to burn, of course, was over the piston at the far end of the chamber. The compression ratio used was 5.0 to 1, and the engine would knock when operated with straight gasoline as fuel, with the shape of chamber used.

It must be remembered, of course, that the flame records were obtained only for a narrow strip, represented by a quartz window. Thus the photographs are really "plots" of flame front position or flame travel against time under this window and do not show what happens in other portions of the combustion chamber, nor do they give information as to the shape of the flame front.

Fig. 3 shows typical records obtained with the apparatus. The figures at the left of the flame photo refer to inches of length of the quartz window. A and B are the two sparks previously mentioned. The direction of flame travel, of course, was from the bottom to the top of the picture, the film moving continuously from right to left over the quartz window.

The picture at the right, using non-knocking benzene, shows a flame starting at the spark plug and moving fairly uniformly toward the end of the chamber, the time required being about 40 deg. of crankshaft revolution. The pressure record, below, is also smooth.

In the records at the left, however, it will be noted that there is a sudden inflammation of the last part of the charge, accompanied by a sharp rise in pressure. This did not happen until the flame had reached a point about  $3\frac{1}{2}$  in. from the spark plug, up to which point the rapidity of flame travel was about the same as in the picture at the right.

It will be noted that the flame fronts appear very distinctly in both cases along the upper left hand edges. The inference drawn from this, and particularly from other experiments, is that the hydrocarbons of the fuel are all oxidized in the flame front. The afterglow shown on the photos, it is stated, is due to equilibrium changes in the burnt gases.

Fig. 4 shows similar photographic records, using gasoline with varying proportions of tetraethyl lead. While taking these records the engine conditions, such as spark advance, jacket temperature, and throttle opening, were kept as nearly as possible like those shown on the left in Fig. 3, since it was desired to study the difference between straight gasolines and those containing ethyl fluid.

It will be noted that even the small addition of 2.5 cc. of fluid to a gallon of gasoline has virtually eliminated the knock (see record at left) while an additional 5 cc. was more than enough to totally eliminate it (compare pressure records at the right of Figs. 3 and 4).

Another fact to be noted is that the average rate of flame travel prior to the beginning of the knock was not appreciably changed by the presence of tetraethyl in the fuel. In all three cases the flame front is about 2 in. from the spark plug 20 deg. after the first spark.

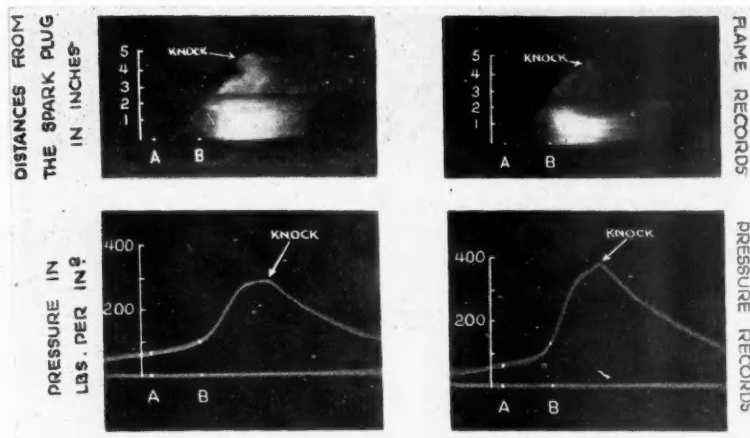


Fig. 5—Records showing two types of incipient knock that have been observed in gasoline engines. In the view on the left, spontaneous ignition occurs at a point midway between the flame front and the end of the combustion chamber, while in the view on the right, spontaneous ignition occurs near the end of the combustion chamber + + + +

A close study of the flame picture at the upper left also shows that at the time the slight knock still present occurred, spontaneous combustion started at a point not yet reached by the flame front, the flame spreading down to meet the normal flame front and also upward toward the end of the combustion chamber. A further illustration of this is shown at the upper left in Fig. 5.

It should also be noted that the flame picture at the right of Fig. 4 is quite similar to that of the record at the right of Fig. 3, taken with benzene as fuel. From this and many other pictures of the same type the conclusion is drawn that when enough ethyl fluid is added to eliminate knocking, the combustion which occurs is like that of benzene and air, which with this apparatus and conditions of tests was entirely free from knock.

Fig. 5 shows flame and pressure records with the engine just barely knocking, but not appreciably. Both of these pictures show that the last part of the charge in the combustion chamber starts to burn before it is reached by the flame front. In the case at the left the spontaneous ignition starts midway between the flame front and the end of the combustion chamber. At the right it seems to start virtually at the end of the chamber and work back toward the flame front. In the case at the left, it will be noted that there is considerable distortion of the pressure curve from the normal. This is credited to the fact that the charge in the chamber was burning in three places at once following the instant of spontaneous ignition, including the normal flame front, and on both sides of the point of spontaneous ignition.

The inference to be drawn from these records is that the spontaneous ignition is the result of adiabatic compression of the unburned portion of the charge, produced by the expansion of the charge already burned. The violence or intensity of the knock is determined by how much of the total charge is involved in the spontaneous or instantaneous ignition. A violent knock is shown, for instance, at the upper left of Fig. 3, a light knock at the right of Fig. 5.

When You  
BUY an AUTOMOBILE  
You GIVE

3 Months' Work  
to Someone



Which  
Allows  
Him to  
BUY

OTHER PRODUCTS

BUY A CAR NOW—HELP BRING BACK PROSPERITY

This poster appears as a supplement to the July issue of Automobile Trade Journal

EVERY new car purchased represents approximately three months' of working time for someone, according to a computation made from the most competent sources available.

Based upon 1930 figures, about 71 man-days are required to gather and prepare raw materials, fabricate parts and to build, sell finance and perform other services in merchandising an "average" motor vehicle.

Last year there were 574,124 employees in motor vehicle factories, and in making original equipment parts, accessories and tires. (This estimate does not include the men who made replacement parts and tires). Divided into 3,510,178, the 1930 production total, this represents 40 man-days of work per motor vehicle produced.

Approximately 136,000 were employed to gather and prepare and transport raw materials for last year's motor vehicle production. This included miners, lum-

ber workers, cotton and rubber plantation workers, fabric mill hands, machinists and other employees in machine tool plants, chemical, glass, steel and metal plants, etc., and employees of railroad and shipping lines. This, in turn, represents 9 man-days of work per motor vehicle for the year.

In the merchandising field of the industry, each motor vehicle sale represented about 22 man-days of work. This was distributed in dealer establishments, finance and insurance agencies, banks, advertising and other merchandising service prorated to the sale of new motor vehicles. About 362,000 were thus employed in 1930.

The "average" motor vehicle and the "average man-day" are both figments of statistical necessity in determining the amount of buying power released every time a new car is sold. Days of work in seasonal industries have been weighted by National Industrial Conference Board data.

The "man-day" represents a few minutes of work by thousands of men and women throughout the world, most of whom, however, are employed in this country and all were connected directly or indirectly, on full time or part time, in producing and selling cars and trucks.

### Employees in Automotive Industry, 1930

(Partly Estimated)

#### Motor Vehicle Employees (1) (3) (5)

Motor Vehicle Factory Workers.....	325,124
Parts and Accessory Workers.....	170,000
Tire Workers .....	65,000
Miscellaneous Clerks, etc. ....	14,000
Total Directly Employed .....	574,124

#### Employees Supplying Raw Materials (1) (5)

Iron and Steel Workers.....	60,000
Other Metal Workers.....	15,000
Lumber-Mills and Woodworkers.....	8,000
Electric Power and Coal Miners.....	6,000
Weavers and Textile Workers.....	5,000
Land and Water Transportation.....	20,000
Miscellaneous Raw Materials.....	22,000
Total Prorated to Automobile Industries..	136,000

#### Merchandising Employees (5)

Dealers and Dealer Salesmen (2).....	300,000
Finance Company and Insurance (4).....	12,000
Advertising, Publishing, etc. (4).....	50,000
Total Prorated to Automobile Industries..	362,000

- (1) Department of Labor Statistics.  
(2) Chilton Trade List.  
(3) N.A.C.C. "Facts and Figures."  
(4) Department of Commerce.  
(5) National Industrial Conference Board.



# Stabilization of Industry Will Follow



by  
Joseph  
Geschelin

"SIXTY years ago they said the same thing about the depression, about unemployment, and the terrifying effects of technological unemployment. But I saw that depression go and others come and go just as this one will before we realize it," loudly whispered a pioneer machine tool builder as we listened to a dinner speaker discussing unemployment at the American Society of Mechanical Engineers regional meeting in Hartford last month.

So it goes. Human nature is about as invariable as nature's own laws. When economics does a nose dive we pull up sharply; we emphasize a lot of problems and overemphasize many others that we forget when things look up. But thinking executives are wrestling with two all-inclusive questions—what can we do now; what can we learn from the present situation?

Perhaps there will be no definite answer. Certainly there are no panaceas in sight. But much constructive work can be done in approaching these problems. Our government and many public organizations have done considerable research work during the past year. We followed with special interest the several stabilization and unemployment conferences staged by the A.S.M.E. Reports of these were published in *Automotive Industries*, Dec. 13, 1930,\* Dec. 20, 1930;† June 6, 1931.‡ We have also interviewed a number of noted economists who are studying the

broader aspects of the problem both from a practical and scientific point of view.

About two weeks ago we had the unusual pleasure of interviewing Dr. Julius Klein, Assistant Secretary of Commerce, and came away with some important suggestions which are discussed elsewhere in this article. The more we attend unemployment conferences, the more we talk to economists, the more we are convinced that Dr. Klein is doing an outstanding job right now. With unexhaustible energy he is working to create and restore confidence. And confidence on the part of executives, workers and the buying public is undoubtedly the key to the present situation.

With this background, it is our purpose to discuss specifically certain topics such as stabilization, technological unemployment, trend curves, wages, and the other questions uppermost in people's minds. And we preface this discussion with the truism that the objective of all business enterprise is to make profits—earn dividends. Ultimately this is translated into wages—wages of capital and wages of labor. Conservation of capital investment, maintenance of earnings on capital and the very growth and expansion of industry are inescapably linked with our treatment of these factors.

Momentarily, we are concerned with the question—what can we do now? This must be attacked on two fronts:

1. External and public relations.
2. Internal management problems.

Consider the first question. Someone said recently that the way to end a depression is to invent some-

\*"Regularization of Output Leads Other Topics at A.S.M.E. Annual Meeting."

†"More Active and Sensitive Statistics Will Smooth the Way to an Even Sales Curve."

‡A.S.M.E. meeting, Hartford.

# Wage Studies and Marketing Research

Major business depressions should teach industry to:

Study domestic and foreign distribution costs.

Build up exports.

Advertise American-made products abroad on a cooperative basis.

Establish territorial quotas in foreign trade.

Determine a definite replacement program.

Eliminate waste through simplification.

—Commented Dr. Julius Klein in an interview with the author.

thing. It's a mighty sound idea. According to economists, and figures published on the subject, there is an abundance of funds tied up in savings accounts. Indeed, we have a situation where unavailable savings exceed investments. Anything that will restore general confidence, coax into circulation some of these vast funds, may swing the pendulum.

In the automotive industry we are looking to the engineers for the striking changes, novelty in design and the readjustment in prices which are calculated to produce this result. Free wheeling, front drive, body streamlining and rear-engine drive are some of the things we have in mind. At least one car manufacturer has made phenomenal strides this year with a product having striking appeal.

Now the matter of costs is inescapable. And, in the opinion of Dr. Klein and others, distribution costs are a major item in the final cost of an automobile. In fact, it is a more important factor than certain wages, which will be discussed later.

In the specific drive to produce sales, the industry should make a concerted effort to increase confidence—on the part of the buying public and the workers within the industry who in themselves constitute a large buying influence. Consider technological unemployment.\* The automotive industry has been taxed with this particular evil. We have been led to believe by demagogues, agitators and many otherwise well-intentioned people, that the highly mechanized automotive industry constantly manufactures technological unemployment.

What are the facts?

For one thing, we know that when people talk about the automotive industry they seem to have in mind the automobile plants. True, these are highly mechanized and, undoubtedly, create some technological unemployment through improvements in equipment,

\*Secretary of Labor W. N. Doak, on May 19, 1931, appointed a committee to investigate this problem.

management, etc. But these thousands of parts plants and factories in other related industries—not to speak of primary sources of raw materials—these constitute the major part of the automotive industry and include one of the largest group of employers in the country.

It is a matter of record that wages (wages and salaries) constitute a large portion of prime cost. This is clearly illustrated in Table 1, according to Paul H. Douglas.† Particularly significant are the total percentages of wages and salaries from 1899 to 1927 which show but little significant shift. Certainly this nation-wide survey does not indicate any impending catastrophe due to technological unemployment.

For those interested in a detailed description of technological unemployment in its broad aspect, we recommend the truly absorbing section of technological unemployment in the new book, "The Problem of Unemployment," by Paul H. Douglas and Aaron Director, which was published last month by Macmillan.

What can be done *now* within the organization? The problem of wages easily predominates. But in the automotive industry it has a special significance which must not be obscured. Wages have formed a main topic of discussion during the present depression. However, we must remember that wages in general are a national problem intimately related to general economic conditions such as standards of living, general level of commodity prices, etc. As a matter of fact, it cannot be denied that the general level of wages has been scaled down already to conform with present trends.

But the specific problem of the automotive industry is the wages of foremen and other minor executives in the manufacturing departments. In the automotive industry tremendous strides have been made in the

†"The Movement of Money and Real Earnings in the United States, 1926-28."

Although there are one million out of work in the automotive and allied industries, there are four million still employed.

These four million jobs have been created since 1900 by mechanizing manufacture.

This fact is true also in other industries such as iceless refrigeration, domestic appliances, etc.

Thus, technological factors have created more employment than they have unemployment. —Prof. John Younger, Department of Industrial Engineering, Ohio State University; Vice-Pres. S.A.E. Production Activity in 1930.

elimination of waste, budget control of manufacturing expense and the sweeping reduction in non-production and overhead burden.

How many of us realize that these important savings are not achieved mechanically or automatically but are dependent upon the good will, enthusiasm and cooperation of the foreman and other production executives? Works managers know this. The writer has talked with many of them during the past year and knows just how keenly they feel about it.

Since these savings are directly translatable into capital profits, shouldn't an effort be made to insure their continuance? The works managers, with whom we talked recently, feel that these savings cannot be maintained without the cooperation of the foreman and they see a positive loss in cooperation if the wages of these men are cut. As a matter of fact, the wages of this group represent only a small proportion of the payroll. Cutting this part of the payroll may affect production cost by only one per cent or less. Yet the profit losses may run all out of proportion. More than ever the foreman is recognized as being the key man in an industrial plant. Many important decisions throughout the day depend upon his judgment. His enthusiasm and cooperation are measurable in profit dollars. One must think very carefully before taking any step that might impair the performance of this profit-making unit.

Labor turnover among foremen and other executives in the organization is another vital and much discussed factor. Its seriousness may be inferred from the fact that H. L. Horning prepared a paper on the subject which he read at the Society of Automotive Engineers' summer meeting. Labor turnover, like the other factors discussed, should be considered from the standpoint of cost and result.

In a highly mechanized industry the cost of turnover of the general class of wage earners is probably not appreciable despite the sometimes violent fluctuations in turnover rate. But it is certainly costly in executive personnel. Aside from the expense of training the men to the point where they fit into the scheme of the organization is the effect upon their morale in general due to the insecurity of the job. Yet, these are the men upon whom falls the burden of the work of administering the budgets, elimination of waste campaigns and the other activities designed to cut overhead costs and directly affect net profits.

It is inconceivable that the lessons of a major depression are to be lost. What can be done in the future to produce more stability in the industry; to cushion the shock, and mitigate effects of minor or major depression cycles? Suppose we eliminate sociological or humanitarian considerations from the discus-

sion and look at it as purely a matter of cold business. The costs of depression are high. When we consider the vast sums tied up in idle capital and equipment; the general dwindling of wages of capital; and the tremendous losses in purchasing power, we may well agree that strenuous steps are in order.

The first step is some form of industry-wide planning. We have the agencies at hand in the National Automobile Chamber of Commerce and the Society of Automotive Engineers. The recent agreement of the former regarding model changes might be taken as a fine example of the type of planning we mean, were that plan being adhered to in practice.

Dr. Julius Klein recently gave the writer the following suggestions for an automotive trade associations' planning program:

1. A study of distribution costs, domestic and foreign.
2. Concerted effort to build up exports—particularly in South America.
3. Cooperative advertising in foreign countries to stimulate buying of automotive products.
4. Territorial quotas by agreement in foreign trade to eliminate destructive competition and high distribution costs in restricted markets.
5. A definite equipment replacement program.
6. Elimination of waste through simplification.

Then there are other suggestions which might well be considered:

1. Comprehensive road building program using funds during declines.
2. Reserve funds of the nature of unemployment insurance for foremen and other production executives. Out of this fund could come the wage stabilization during declines.
3. A study of seasonal fluctuations in sales supplemented by campaigns to extend buying through all seasons of the year.

Disturbing elements in the whole situation are the fallacies bandied about by otherwise well-meaning persons, the net result being to confuse people and shunt their thinking from proper channels. And the pity of it all is that some of these fallacious ideas may be translated into legislation.

Here are just a few to illustrate the point. Much is being said about certain stabilized industries, but how do the principles of making and selling soap, wax

paper or valve fittings apply to building automobiles? The automotive industry has its own problems which must be tackled in an entirely different fashion. \*Unemployment insurance is being talked about a good

\*According to Wilbur D. Spencer, Insurance Commissioner, State of Maine, a proposal for a state mutual unemployment insurance act was defeated at the last session of the Maine legislature.

(Turn to page 16, please)

Total Amount Paid in Wages and Salaries  
in Census Years

YEAR	VALUE ADDED MANUFACTURE	WAGES	SALARIES	PERCENTAGE CHANGE		
	Thousands			Wages	Salaries	Wages and Salaries
1849.....	\$ 463,983	\$ 236,755		51		
1859.....	854,257	378,879		44		
1869.....	1,395,119	620,467		44		
1879.....	1,972,756	947,954		48		
1889.....	4,210,365	1,891,220		45		
1899.....	4,831,075	2,008,361	\$ 380,771	42	8	50
1904.....	6,293,695	2,610,445	574,439	41	9	50
1909.....	8,529,261	3,427,038	938,575	40	11	51
1914.....	9,823,351	4,063,211	1,275,917	41	13	54
1919.....	24,843,803	10,452,586	2,892,371	42	12	54
1921.....	18,272,417	8,192,952	2,563,103	45	14	59
1923.....	25,777,616	10,999,282	3,014,246	43	12	55
1925.....	26,778,066	10,729,969	3,147,329	40	12	52
1927.....	27,585,210	10,848,803	3,229,525	39	12	51



## The Handicaps of Henry Ford

IN an evaluation of Henry Ford and the employment and industrial policies of the Ford Motor Co., Murray Godwin, writing in *The American Mercury* (July), concludes that "privileged business" has been taking tribute from the company for 28 years.

Outlining the development of the concern and the role of director of its destinies which Mr. Ford played, the author sees this as "the nearest thing to a strictly productive, strictly unprivileged big business we have."

"Handicapped from the start by the exactions of privileged business, it has survived by the intensive employment of industrial efficiency. We must not make the mistake of regarding Ford as a wholly free agent. Privilege has had him under pressure from the beginning."

"His critics are prone to think that industrial necessity starts only when one nears the assembly line. It starts with material prices, raised artificially by tariff or monopoly, which the company must pay."

In reviewing the story of the great 1921 shutdown, Mr. Godwin says that Mr. Ford raised money by arbitrary methods, but gave as security for the money

he obtained from his dealer organization "at least salable goods."

"Ford, faced by huge and pressing debts, shut off material shipments, made all stock on hand into cars, forced the cars upon his dealers for cash, and with the cash put the company on a solvent basis again. . . . Some (of the dealers) went to the wall, others quit in despair; the majority survived to undergo a very considerable prosperity."

"What if Ford had lost control," he asks, instead of having readjusted the company's financial position? "Within a month or two a mountain of Ford stock would have burdened the country, as a mountain of Dodge Brothers stock burdened it later on," he said, in discussing the probable outcome had Wall Street bankers been able to lend assistance to the company and had taken control in exchange."

The author makes a case against newspapers for misinterpreting the policies announced from time to time by Mr. Ford, and pointed out that real estate operators soaked up "the productively earned wages that Ford paid his men."

## For the Business Bookshelf

### Das Volksauto

Rettung oder Untergang der deutschen Automobilindustrie? By Dr.-Ing. L. Betz. Published by Wilhelm Petri, Stuttgart, Germany.

IN this booklet, entitled *The Popular Automobile—Salvation or Ruin of the German Industry?*, the author makes the proposal that the various works now manufacturing low-priced cars in Germany join forces to build a small car of advanced design that would meet the requirements of the average potential buyer, each factory making the particular part for which it is best suited. According to the author there are only two possible ways of saving the German automobile industry, one being by a combination such as outlined, the other by an alliance with Ford. The book probably would have received more serious consideration from the German industry if, on the one hand, the author were not so absolutely sure regarding every single step the German industry must take to achieve its salvation and, on the other, if he had been a little less liberal with destructive criticism. He does not limit himself to stating of the industry as a whole that every single move it has made since the war has been wrong, but takes up the companies one by one and tells them exactly what blunders they have made.

### Soviet Foreign Trade: Menace or Promise

By J. M. Budish and Samuel S. Shipman of the Economic Division, Amtorg Trading Corp. New York, Horace Liveright, Inc., 1931.

FRANKLY offered in support of the extension of United States' trade with Soviet Russia, the volume titled above is a fairly comprehensive review of such trade in the past and its prospects for the future, both before and after the hoped-for completion of the Five-

Year Plan. Most of the figures quoted are from official sources and are supplemented with material from the files of the Amtorg Trading Corp.

The volume is not unduly polemic in tone, and makes many interesting data on the Russian market readily accessible. Automotive references are few and add little to the facts now known. There is a rather naive inference that the Russian market for passenger cars, during the next five years, will approach in magnitude that of the United States during the period 1924-1929.

### Neuzeitlicher Verkehrsbau

By H. Gescheit and K. O. Wittmann. Published by Mueller & I. Klepenheuer G.m.b.H. Verlag, Potsdam, Germany.

THE title of this volume may be translated as *Modern Transportation Structures*. It contains very little text, but shows numerous plans and photographs of subways, railway stations, elevated railways, waterpower works, and structures for ships, automobiles and airplanes. More than two-thirds of the book is devoted to illustrations of large garages, automobile and engine factories, aircraft factories, filling stations, traffic towers, airports, hangars, etc.

## Correction

IN the description of the new Packard series which appeared in *Automotive Industries*, June 20, it was erroneously stated that the car was equipped with Delco-Remy shock absorbers instead of Delco Lovejoy equipment, manufactured by the Delco Products Corp., Dayton, Ohio.

# Engine on New Plymouth is

A NEW method of powerplant mounting which is claimed to almost completely prevent the transmission of engine vibration to the chassis frame, free-wheeling in combination with a constant-mesh second-speed, easy-shifting transmission, and automatic spark advance by the vacuum in the carburetor are the most important innovations in the new Plymouth line just announced. Prices generally remain approximately the same; those of the sports models have been reduced by from \$15 to \$50, while prices of two models—the two-door and four-door sedans—have been increased \$10 each.

Of the new developments the most interesting probably is the powerplant mounting. It is a two-point rubber mounting, with one support located fairly high at the front of the engine and one at the rear of the transmission, approximately below the free-wheeling unit, but on an arc about the crankshaft centerline. A third point of support is at the bottom of the clutch housing, where a horizontal "stabilizing" quarter-elliptic leaf spring is anchored, whose small end is held between two rubber blocks below the frame side rail.

With a four-cylinder engine there are two principal causes of vibration, viz., variation in the torque reaction, which is much greater than in an engine with a larger number of cylinders; and the secondary inertia forces, which are additive in a four, whereas in a six or an eight they cancel out.

When such a four-cylinder engine is supported on the frame at the crankcase, variations in crankshaft torque tend to cause it to rock around a fore-and-aft axis, passing centrally through the plane of support. The center of gravity is located considerably above this plane, which adds materially to the moment of inertia around the axis of vibration. With rigid mountings this vibration was transmitted to the frame and body, and thus was felt by the occupants.

The adoption of rubber mountings, some time ago,

helped materially, but it was found impossible to provide both enough flexibility and enough internal friction, together with strength to completely prevent the transmission of engine vibrations to the frame. It was, therefore, decided to mount the engine on an axis containing the center of gravity.

The determination of this axis is a relatively simple matter. It is, of course, necessary to locate the rear support about the centerline of the extension

from the powerplant, so as to hold this point constant. By determining the center of gravity of the powerplant and drawing a straight line from the rear support through the center of gravity, the location of the front support is readily determined, since it must lie some place along this axis, and the most convenient place along the axis can be selected.

In the case of the Plymouth this was at the fan-shaft or water pump and a triangular frame was built up back of the radiator and fan to carry this support. The rubber used in both front and rear supports, as well as in the blocks between which the stabilizer spring is mounted at the frame, is quite flexible so as to permit whatever motion the engine would normally go through under torque reaction variations without transmitting these movements or impulses to the frame. The rubber itself cushions the frame against vertical vibrations due to the unbalanced inertia forces. The Plymouth engine when supported in

## New Prices

	New Price	Old Price	Change
2-p. Roadster .....	\$535	\$535	None
2-4-p. Sport Roadster ....	595	610	\$15 less
5-p. Spt. Phaeton .....	595	625	30 less
2-p. Coupe .....	565	565	None
2-4-p. Coupe .....	610	625	15 less
Convert. Coupe .....	645	695	50 less
2-door Sedan .....	575	565	10 more
4-door Sedan .....	635	625	10 more

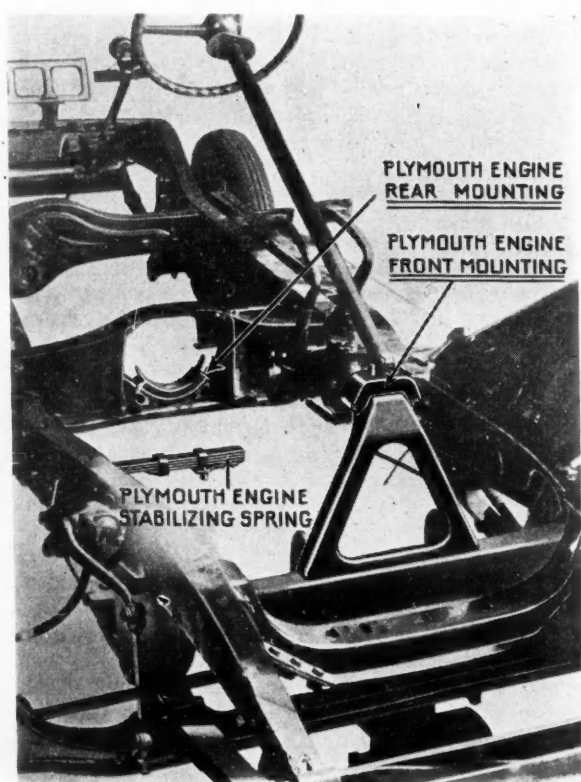


Photo of frame showing locations of the two rubber supports for the powerplant and the stabilizing spring + + + + +

# Cradle-Mounted

by  
Athel F.  
Denham

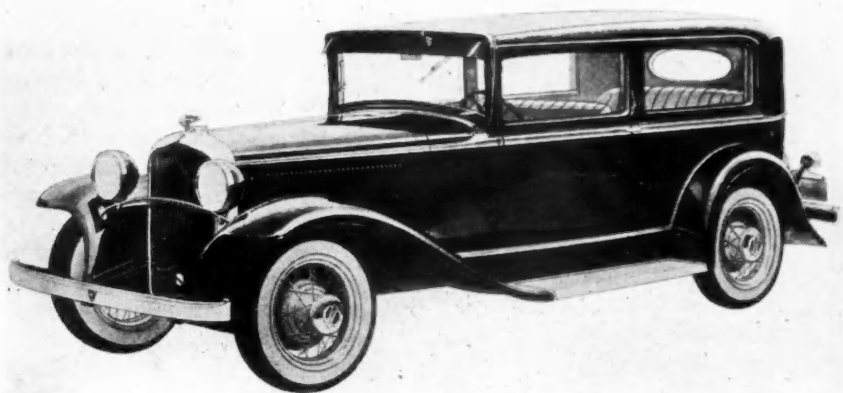
this manner virtually acts as a weight rocking on a shaft.

The purpose of the stabilizer spring is to prevent too large a movement of the powerplant about the axis of oscillation under high torque load variations. It thus merely limits the amount of engine movement, and transmits the torque reaction impulses to the frame at frequencies below those which produce annoying vibrations in the chassis frame or body.

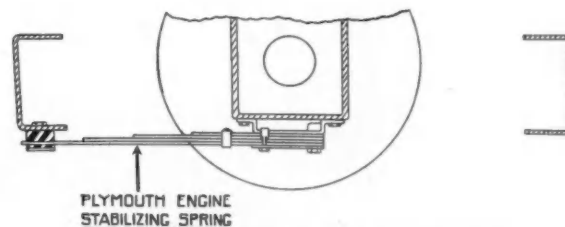
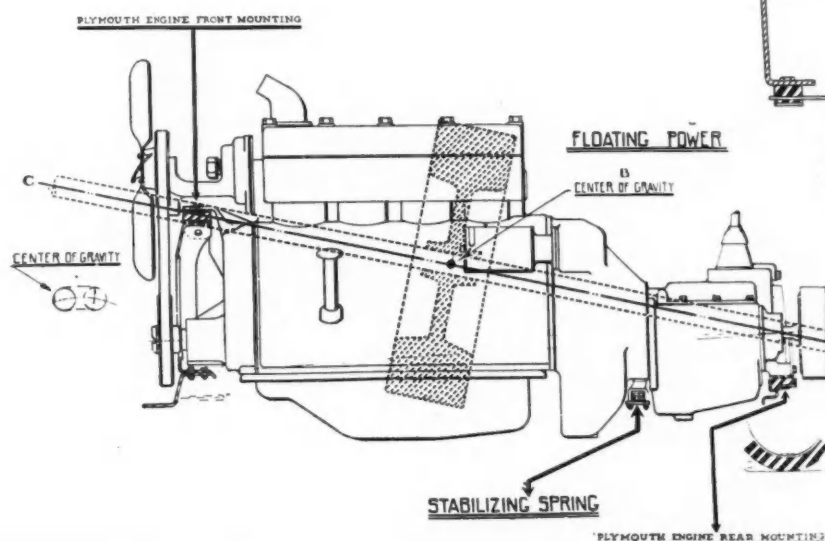
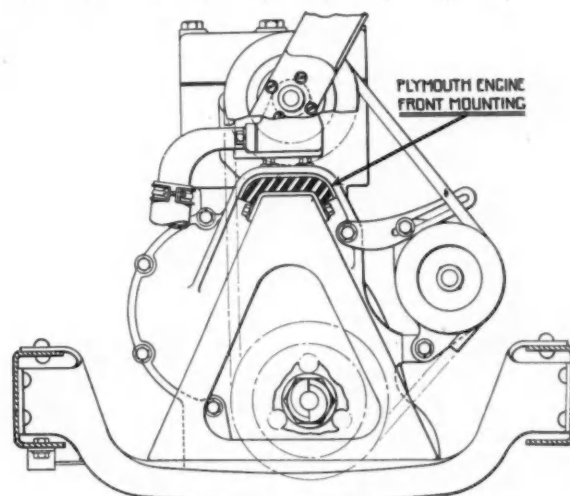
Two effects of mounting the powerplant in this way are that engine movements, while actually no less than in normal designs, are not carried over into the frame in the form of synchronous vibration, and that the high location of the front engine mounting, with its resulting long lever arm, adds considerably to the polar moment of inertia of the front end. This reduces the natural rate of transverse vibration of the front end.

To make the use of the "floating-power" mounting fully effective, the control mechanisms have been dissociated from the engine. Clutch and brake pedals are now carried on the frame, as is the brake master cylinder, the clutch pedal being linked with the throw-out mechanism in such a manner that there is no direct contact between clutch pedal and powerplant, except when the clutch is depressed. Both the gearshift and transmission levers, moreover, are mounted on a frame crossmember and are designed so that they are not in contact with the powerplant except, in the case of

(Turn to page 33, please)



Plymouth two-door sedan, listing at \$575, with wire wheels and free wheeling + + + + + + + + + +



Above—Front view of powerplant showing the front support on a rubber block and the stabilizing spring clipped to the front end of the block and guided between rubber pads on the frame side rail + + +  
Left—Diagram of the new powerplant suspension system, showing the powerplant to be mounted on an axis sloping down toward the rear and passing through its center of gravity



# JUST AMONG OURSELVES

## More for the Workers

"THERE'S going to be less spread between the sums received by stockholders and the sums received by workers in the automobile business in the future than there has been in the past," a high executive of a big automotive company told us the other day. "Doesn't sound so good from a stock-market standpoint to say that, I realize," he continued, "but the fact remains that management will be wise to see to it that workers get better protection and better share in the proceeds as time goes on."

It's interesting to find that point of view cropping up with fair frequency as one circulates about from one management group to another these days. We haven't heard the subject discussed among executives at great length, to be sure, but there seems to be a greater feeling of social responsibility on the part of management today than we've ever sensed before.

## Less Conversation, More Intention

BACK in 1919 and 1920 we found lots more conversation about welfare work, personnel plans and whatnot. But the very publicity with which all that conversation took place made much of it sound a bit superficial. Today nobody mentions the subject of labor except behind closed doors. And yet we've heard very liberal—almost radical—views being expressed in some of the sanctums of conservatism.

Particularly does this seem to be true among the younger executives who have risen to

operating power in recent years. There are interesting developments in industrial relations to be witnessed by those who follow the course of automotive growth during the next decade or so.

Most car manufacturers are going to continue to provide discounts to independent repair shops and rival dealers on replacement parts. Several dealer groups have protested the practice recently and in individual instances have declared that they'll give no discounts to any independent who comes to their door.

Certainly the average dealer has been a broken crutch so far as being a merchandiser of parts to independents is concerned. Most of them, our guess is, probably will continue in this category. Some factory sales managers, though, still have hopes of getting bigger parts volume through dealer parts-selling effort because they have a few instances of real success to point to. Maybe they'll succeed in the long run. Who knows?

In the meantime, the main fact is that most factories will continue to allow, and probably to urge, the giving of parts discounts to independents. Some of them believe in it as a goodwill gesture, whether they sell many parts as a result or not.

## From Fleet Service Floats Shekels

TALKED to the head of one of the biggest fleet operations in the country a while back and listened to him flay car and truck manufacturers for negligence in failing to help and urge their dealers to pro-

curement of profitable fleet service business.

Fleet service is a special breed of cat, he admits, but claims that there is money in it for the dealer who will take it seriously, solicit it intelligently, and handle it faithfully. He feels, however, that factory help in planning and selling such business probably is needed to get most dealers properly started.

He threw out interesting and practical comments so fast we couldn't catch them all; so we're busy now trying to get him to write a full article on the subject under his own name.

## Dip 'Em Not Drown 'Em

"If you want to kill any idea in the world today," said C. F. Kettering the other day, "just get a committee working on it—picking flaws in it. Why? Because not one man in a thousand has any imagination."

He went on to say—it was in a talk before the Advertising Federation of America—that production by committee was being shown to have its limitations and suggested that the individual man might yet make his mark in the development of new products. Mr. Kettering is right, of course. Only trouble is that out of those 100 men in 100,000 who have imagination, about one out of the hundred has vision while the other ninety-nine have hallucinations. Plenty of good ideas do get committed to death, to be sure, but so do plenty of hallucinations.

What is needed practically is a sort of quick dipping of ideas into committees by an active general executive.

If the idea is killed by the quick dip, it probably was an hallucination anyhow.

Having survived the quick dip, on the other hand, it should be removed to the purer air of individual responsibility and effort for further development. —N.G.S.

# Aircraft Bulk Large in Reports at S. A. E. Standards Session

A standard practice on motor-truck chassis dimensions was adopted at the Summer Meeting + + + + +

**S** EVEN divisions presented reports at the meeting of the Standards Committee, which was held at the Greenbrier Hotel on Wednesday. It was quite evident from the reports that standardization work in connection with automobile parts has ebbed off considerably, and that most effort is now being devoted to aircraft, the reports of the Aircraft Division and of the Aircraft Engine Division bulking quite large in the proceedings.

The Aircraft Division proposed that the recommended practice for high-pressure type airplane-tire valves be revised to include the 12 by 4-in. high-pressure tire size for valve No. 61, and it submitted for adoption as recommended practice specifications for two sizes of low-pressure airplane tires, known as Nos. 90 and 91. Revisions were proposed also for the standards and recommended practices relating to thermometer bulbs, aircraft instrument cases and mountings, and tachometer drive, the object of the proposal being to bring these items into conformity with present Army and Navy standards. Tables of dimensions of carbon-steel, alloy-steel and aluminum-alloy tubing in both the round and streamline types were proposed for adoption as standard. In addition to the dimensions of the tubes, the tables give their characteristics, such as section area in sq. in., moment of inertia, section modulus and radius of gyration.

The division also proposed for adoption series of both low-pressure type and high-pressure type airplane landing wheel rims, the width between flanges ranging from 4¾ to 11¼ in. in the case of the low-pressure rims, and the rim size from 3 in. to 14 in. in the case of the high-pressure rims. The specifications of rims for low-pressure landing gear tires were submitted as a new proposed recommended practice, while the specification of high-pressure rims formed a revision of a recommended practice already on the records. These proposals for rims for aircraft landing gear were paralleled by proposals for tires for landing gear, of both the low-pressure and the high-pressure types, the low-pressure series (ranging from 6.50-10 to 15.00-16) being a new proposal and the high-pressure series (10 by 3 to 58 by 14) a revision. Load and inflation tables for both series of tires were also included in the report. The division further recommended the addition of a number of sizes of brazier-head rivets to the standard for aluminum-alloy rivets adopted last January, and that specifications of slotted shear nuts be included in the present S.A.E. standard for plain and castle hexagon nuts, so that all three

types of aircraft hexagon nuts will be included in a single standard.

The Aircraft Engine Division proposed that the present S.A.E. recommended practice for propeller-blade clamp rings, bolts and nuts be canceled, for the reason that the subjects covered are now more or less obsolete and interchangeability is provided for by the present standard blade-ends. It further proposed that the dimensions of the splined shaft for the small type of engine starter be revised to conform to a generator shaft already standardized, as it was considered desirable to

have both these shafts identical. At the present time fuel pumps are mounted by either bolts or studs in the mounting pad; it was therefore proposed to modify the present standard for fuel pump mounting (which shows bolt holes) accordingly. A new drawing of the standard mounting has been prepared which also shows the pilot and shaft end in the end view.

The division further proposed the addition to the present S.A.E. standard for taper-type propeller hubs and shaft ends, of an additional small size to be known as No. 00. This gives a total of four taper-



Arthur Boor, chairman of the Standards Committee, presided

type shaft ends. These shaft ends are provided with either external or internal threads, and a table for the shaft ends with each type of threads was submitted. Key dimensions for Nos. 1 and 2 shaft ends had been revised to make them accord with present practice. The addition of a large (No. 50) size shaft end of the splined type including the propeller hubs, nuts and rings, and certain refinements in the dimensions of the smaller sizes of splined type shaft ends were proposed.

The Ball and Roller Bearing Division proposed an extension of the S.A.E. recommended practice for lock nuts and washers for ball bearings. The additional sizes were included in the original proposal submitted last January, but were then referred back to the division because of a difference of opinion with regard to the threads for these large nuts, some makers using 11 and others 12 pitch threads. As a result of a fur-

ther meeting of the division at which makers were represented, it was now proposed to adopt lock nuts and washers Nos. 15 to 40, all odd numbers from 23 to 39 inclusive being omitted, and to use 12-pitch threads for Nos. 15 to 30 and 8 pitch threads for Nos. 32 to 40 inclusive.

The division also proposed a revision of the standard for metric thrust ball bearings. The Society has had such a standard on its books for a long time, but practice gradually had grown away from it. In the meantime the suggestion had come from abroad that a general international standard for such bearings be formulated and approved. The subject of the feasibility and advantages of such a standard was assigned for investigation to the Ball and Roller Bearing Division. This division reached the conclusion that it would be uneconomical and unwise for American bearing manufacturers to attempt to change their practice to conform with that abroad, and the division, accordingly, proceeded to revise the S.A.E. standard to meet existing American conditions, with the object of eliminating the relatively few variations now existing between the products of American manufacturers.

The Gasoline Engine Division proposed an additional size of flywheel and clutch housing, the No. 6, which has a bolt-circle diameter of  $10\frac{1}{2}$  in. Diesel engine manufacturers had said that this size was too small for Diesel engines, and returns from gasoline engine manufacturers indicated that its use for gasoline engines would be quite limited, but it was felt that where this size was needed it should be made in accordance with an S.A.E. standard.

A new subject for an S.A.E. Standards Committee meeting was introduced by the Motor Coach and Motor Truck Division, namely, a recommended practice for uniform motor vehicle operating cost classification. The same division made the following proposals for a recommended practice on truck chassis dimensions:

1. The nominal frame width for motor trucks shall be 34 in. outside, with a plus tolerance of  $\frac{5}{8}$  in. and a minus tolerance of zero.
2. The CA dimensions (distance from extreme back

of cab to centerline of rear axle) of motor trucks shall be 39, 48, 60, 72, 84, 102, 120, 138 and 156 in., with a plus tolerance of 1 in. and minus tolerance of zero.

The same subject has been under discussion by the Motor Truck Committee of the N.A.C.C. and by the American Petroleum Institute, and the proposals made at the meeting were formulated after a joint meeting with various other committees.

The Parts and Fittings Division has been reviewing the standards and recommended practices of the Society that were adopted on its recommendation and made a number of proposals for revision. Thus in the standard for rod ends and pins it is proposed to add tolerances of plus and minus 0.010 in. for the width between prongs of the clevis, and plus 0.000 and minus 0.010 in. for the width of the eye. The same tolerances were proposed for the dimension B for tie-rod fittings for cast-type radiators, and it was suggested to specify that the threads in the threaded clevis shall be American Standard (NF) Fine, Class 2 fit.

It was further proposed by this division that the second part of the standard for front bumper mountings be cancelled, as the dimensions apply only to a few replacement jobs and are obsolete so far as new construction is concerned.

The division proposed that the four tables for lock washers now in the S.A.E. Handbook be combined, without reference to the parts (machine screws and bolts) with which they are combined, as lock washers are used also for locking other parts. A single list is now given for lock washers for general use as only one such list of washers is necessary.

The specifications relating to the temper test has been revised to read: "After a first compression to flat, the free height of the lock washer shall be at least  $1\frac{2}{3}$  times its thickness. Subsequent compressions shall no further reduce the free height."

The Screw Threads Division proposed slot dimensions for plain nuts, for adoption as a recommended practice. All proposals were approved by the Standards Committee, Council and business meeting of the society.

## Stabilization of Industry Will Follow Wage Studies and Marketing Research

(Continued from page 10)

deal and we may see some legislation in the near future. It ought to be studied. We may find that in principle it cannot be applied generally in the automotive field because of the high rate of labor turnover. On the other hand, some element such as an insurance fund for foremen may be advisable and desirable.

In general, matters like unemployment insurance, doles, building funds, etc., of necessity may be acted upon only during times of prosperity. Hence there is very little place for considering these when we are concerned with finding a way out of present conditions.

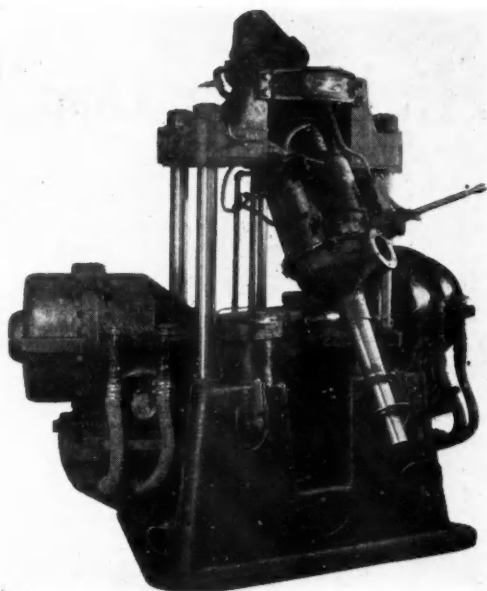
It is questionable whether stabilization of industry in the way it is generally taken can be fully realized. Stabilization is at once national and international. It presupposes careful planning within each industry, coordination of all intranational industries and, finally, international cooperation. These are high ideals. At any rate, our own industrial history and the business cycle trends which have been published recently show

that business activity is unquestionably one of alternating cycles and, unfortunately, no matter how closely the business curves are followed it is impossible to predict with any degree of accuracy whether an impending decline will be of minor or major significance. Nor can we predict exactly when it will start and when or why it will stop.

It appears that business cycles are much like natural phenomena. Perhaps it is reasonable that they should be, because they are linked with the actions of humans. Trend curves of business activity are certainly a guide to intelligent management; if tempered with proper judgment, they will yield valuable returns. It is revealing to see the far-reaching effect of the automotive industry upon all industries when we consider the consumption of raw materials. Is it too visionary then to foresee the stabilizing effect on all industries of stabilizing the automotive industry through planning and research?



# PRODUCTION LINES



Hanna multiple riveting machine for Ford truck rear axle housings. View shows housing clamped in loading position with power operated clamps. Rivets are inserted from the outside and headed on the inside. Four rivets attaching axle tubes to the differential housing are driven simultaneously. Then the assembly is indexed and the remaining four rivets driven. Predetermined pressure is exerted equally on all rivets. The expanding heading mandrel automatically compensates for variations in the inside diameter and eccentricity of the axle tubes. Recently developed by the Hanna Engineering Works, Chicago.

## Conveyorizing Goes Standard

Saginaw Products of Saginaw, Mich., believe it pays to standardize. So do many others. It's unanimous. Saginaw recommends standard chain, standard trolleys throughout. Their track is 4-in. I-beam with standard large wheels. Their steel trolley will fit any track this size. Latest thing is the 458 chain of high-grade nickel-steel, capable of any desired heat-treatment. Interchangeable with the 458 drop-forged chain. Reduce inventory and maintenance with standard units.

## Quiet Requested

Many inquiries followed publication of our series on body silencing. Better look up *Automotive Industries* for April 4 and April 18, 1931. Will some of the body experts tell us where sheet fibre can be used in bodies. Available in colors; in various beautiful grain patterns. To insulate against heat and cold and/or noises. Please!

## Training Foremen

Word comes from Cadillac that their foremen go to school. Instruction is by the conference method mentioned by us before. Course prepared by General Motors Institute of Technology.

## Old Turnings

In 1864, William Sellers, head of the firm which still bears his name, read before the Franklin Institute in Philadelphia a paper proposing

the system of screw thread standards which is variously known as the Sellers, or U. S., standard. Not content with this, he designed and produced machines which could turn out threads adhering to the standard.

He also introduced the standard "machine grey" paint. On the latter item, the pendulum has swung again, and psychologists advocate painting machines bright colors to pep up workers.

## Your Cooperation

Nickel additions to cast iron produce great benefits. When done properly and with understanding. Just a few simple fundamentals need be observed, says current *Nickel Cast Iron News*. For best results consult them.

## Cuts Fastening

Helix nails are a simple metal to metal fastening. Driven in like a nail; holds like a screw. Heavy duty type will drive through 20-gage sheet. Recently developed by the Hillwood Mfg. Co., Cleveland.

## But Is It Right?

How do you figure overhead on capital equipment? Not by referring to direct labor exclusively, hope many cost accountants. And others. One of soundest methods seems to be that of burden centers. Used by some of the largest companies. May require slight modification for smaller units. Certainly more sound than just direct labor.

## Worthy of Respect

Thanks to *Oxy-Acetylene Tips*, June, 1931. Check up your gas-welding department. It will pay dividends. Are pipe tips of proper size? Regulators are important. Do you separate empty cylinders from full ones? By closing valves on empty cylinders you keep out foreign matter. Maintenance makes more efficient service.

## Hang This Up

Instructions for welding aluminum given on handy chart just issued by the Aluminum Co. of America. Ask for it. Gives instructions on torch welding, metallic arc and carbon arc welding, also welding castings. Hang it up in your welding department.

## Multi-Guide Production Firsts

Some firsts from the Chilton Multi-Guide, spring issue, 1931.

1898—Nickel steel used for axles and other parts.

1902—Chrome nickel steel used. High-speed steel (tungsten) tools introduced.

1903—First pressed steel frame made by A. O. Smith.

1907—Ford introduces Vanadium steel.

1909—Bakelite placed on the market.

1921—Molybdenum steel used in auto construction.

1922—Nickel plating becomes popular.

1923—Duco goes into production.

## Welding Becomes Sophisticate

Welding history is being made. Saw some remarkable heavy duty work the other day. Heavy machine parts, Diesel elements, heavy fixtures, etc. Scientifically redesigned, well-proportioned, beautifully made. Several months may bring startling news. Watch this page.—J. G.



# Timken-Detroit Offers "High Traction"

**T**IMKEN DETROIT AXLE CO. announces the availability of a number of its SW series tandem axles for 6-wheel vehicles, equipped with inter-axle differentials. While it is expected that double reduction type of final drive axles will be made available with inter-axle differentials shortly, the optional availability of this design is being confined to the worm drive series.

Fig. 1 shows a cutaway of the worm driving unit, showing the new additional differential offered at extra cost. This differential is of a new type called "High-Traction," designed to automatically compensate for loss of traction on one axle by transmitting additional power to the other axle.

In Fig. 2a is shown a conventional type of differential design, Fig. 2b, showing the High-Traction unit. It will be noted that the number of teeth in the gears of the new unit are lower than in a conventional design, but that they are considerably longer and heavier.

In Figs. 3 to 8, which show the gear teeth of the two differentials in different positions, it will be noted that whereas the traction or torque in the conventional unit is evenly divided between both side gears, there is considerable variation in the lever arm of the tooth contact for the high-traction differential. In Fig. 6 the ratio of lever arms (according to which

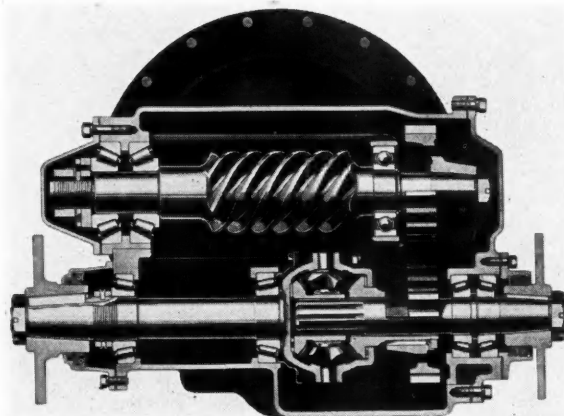


Fig. 1 — This cutaway view of the worm-drive unit with inter-axle differential and spur-gear drive of worm shaft + + +

torque is divided) is 1.63 to 1, in Fig. 7 the ratio is 1 to 1 as in a conventional design and in Fig. 8 the ratio is 1 to 1.63.

Under conditions of unequal traction it is claimed that the increased torque transferred to the side gear connecting to the axle having the greatest traction is sufficient to maintain propulsion of the vehicle until the traction of the two units has again been equalized.

Where equal traction obtains, it is stated, the differential will assume the position shown in Fig. 7.

Referring back to Fig. 1, showing the worm unit of the forward axle of four-wheel rear axle assembly, it will be noted that half of the differential case of the inter-axle differential is integral with the shaft at the lower left, to which engine torque is transmitted. The other half of the differential case is bolted to it. The differential case carries the two pinions, meshing with the two side gears at right and left. The left hand side gear has its hub supported by the differential spider in which it is free to rotate, being splined to the shaft leading to the right of the axle housing and connecting there to the short propeller shaft leading to the rearward axle unit.

The right hand side gear is free to rotate about this shaft, bronze bushings being provided in the hub. To the hub of this side gear is attached by means of

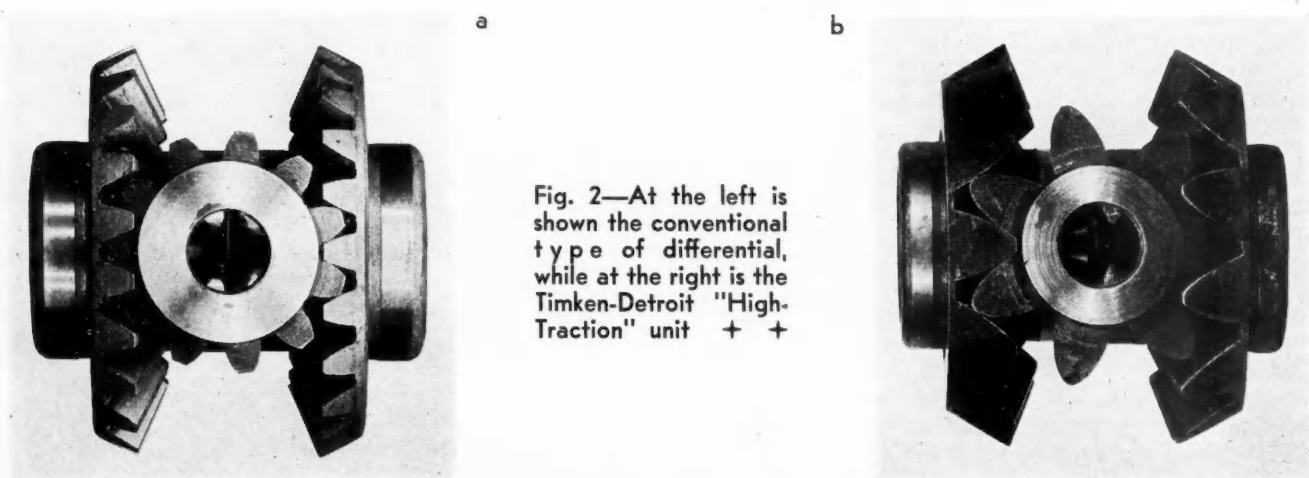
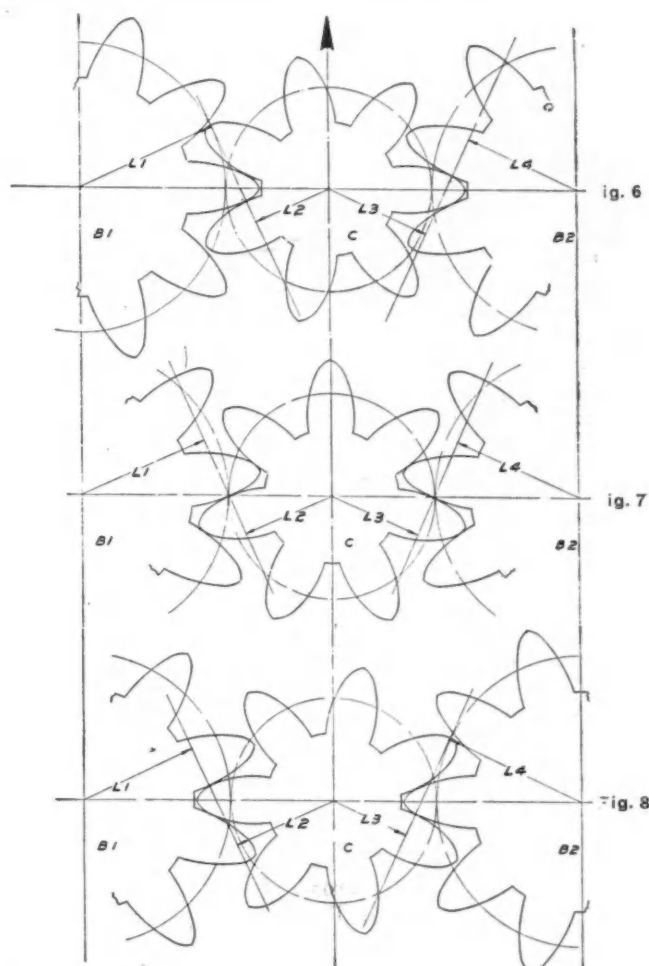
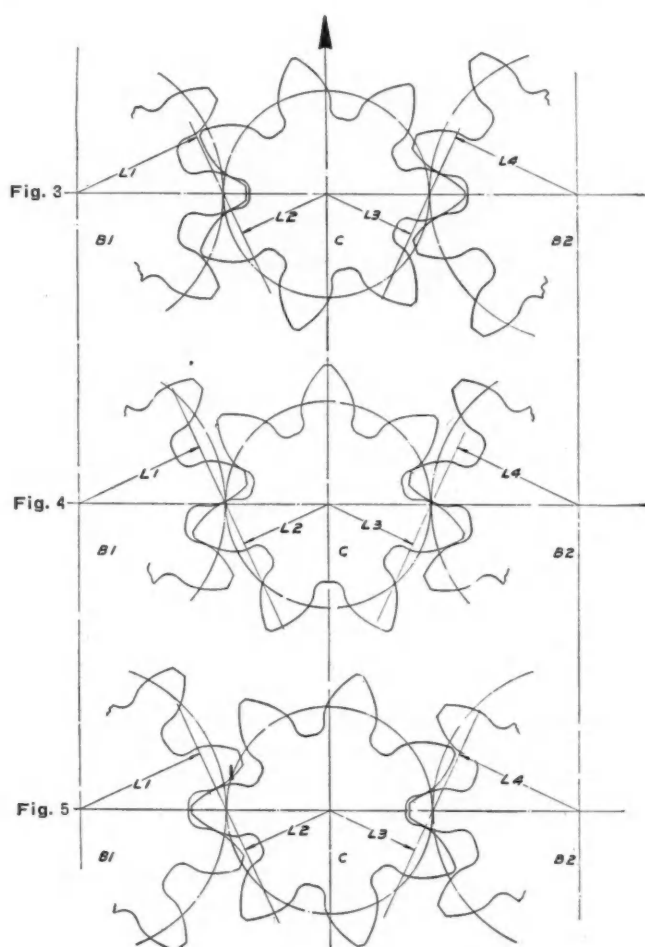


Fig. 2—At the left is shown the conventional type of differential, while at the right is the Timken-Detroit "High-Traction" unit + +

# Differential In and Between Axles



Figs. 3 to 5 (from top to bottom in the left column) show the even division of torque in the differential at the left in Fig. 2, with the teeth in different positions, while Figs. 6 to 8 (from top to bottom in the right column) likewise show the varying lever arm ratios in the differential at the right in Fig. 2 + + + +

splines the large spur gear shown partially cut away at the lower right, which in turn meshes with a spur gear on the worm shaft.

Due to the counter-clockwise rotation of this worm shaft it is fitted with a left-hand thread worm and worm wheel. The rear axle unit carries a right-hand worm and worm wheel.

Most of the units of the Timken SWD series axles, as this series is known, are interchangeable with the standard SW line recently announced, this including axle housings, shafts, bearings, etc. Fig. 9 shows a plan view layout of a Timken SWD series with inter-axle differential, with interconnecting propeller shafts not shown.

The Timken High-Traction differential is also being made available to the industry in place of the conventional differential in a number of standard axles aside from the tandem series.

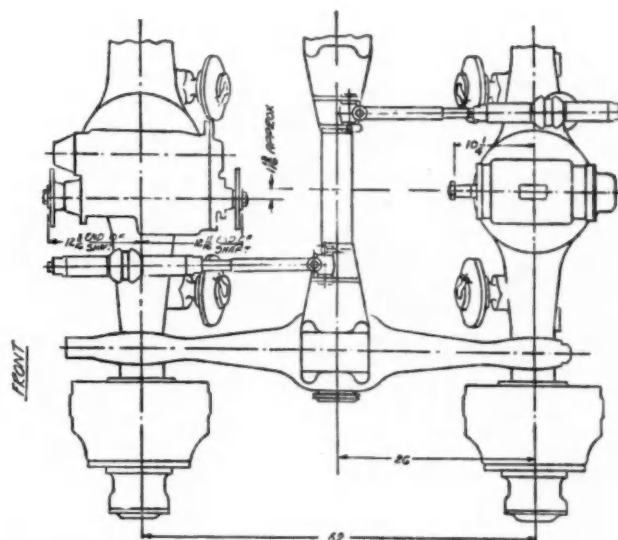
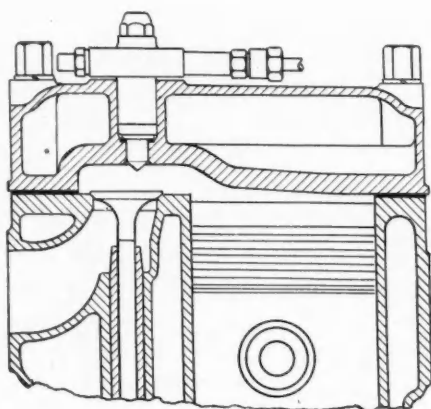
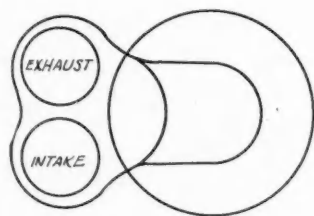


Fig. 9—Plan view of the SWD series with inter-axle differential + + + + +





Figs. 1A and 1B—Combustion chamber of Waukesha Diesel engine + + + + +

**D**IESEL engine designers more than once have declared it impossible to use an L-head type of combustion chamber for a Diesel engine—with its high compression ratio required for compression ignition—without unduly limiting the volumetric efficiency. However, a high-speed Diesel with L-head combustion chamber has been developed by the Waukesha Motor Co., and a cross section of the combustion chamber is shown in Fig. 1. Evidence submitted in this paper will show that it is quite possible to design such a combustion chamber for a compression ratio of 14 to 1 and obtain a volumetric efficiency equal to that of an average L-head gasoline engine. The task was not an easy one, however, and its accomplishment required several years of continuous research. The difficulties that were encountered will be clear from an enumeration of the requirements that must be met.

In the first place, the chamber must have sufficient area and height to accommodate intake and exhaust valves of adequate size, and must leave enough clearance between valve head and cylinder wall for unrestricted flow. Further, it is necessary to compromise on a combustion chamber shape that offers a minimum resistance to the incoming air charge, produces the turbulence necessary for intimately mixing the fuel and air, and can be "covered" by the fuel sprays.



Fig. 2—Four indicator diagrams from Waukesha engine + + +

(No. 1, idling at 900 r.p.m., compression pressure, 425 lb. per sq. in.; explosion pressure, 618 lb. per sq. in. No. 2, part load, 875 r.p.m., 154 lb. torque-arm load; 650 lb. per sq. in. explosion pressure; 41.5 lb. per sq. in. b.m.e.p. No. 3, fuel load, pump normal, 850 r.p.m. 300 lb. torque-arm load; 645 lb. per sq. in. explosion pressure; 80.5 lb. per sq. in. b.m.e.p. No. 4, same data as for No. 3, except pump timing advanced and 730 lb. per sq. in. b.m.e.p.)

## High-Speed Diesel With by Waukesha Motors

In an L-head gasoline engine the greatest resistances to flow of the incoming charge are in the carburetor venturi and the intake manifold, since good performance demands a high mixture speed in these passages. These restrictions are eliminated in the L-head Diesel engine. Another factor contributing to the good volumetric efficiency of the L-head Diesel is the fact that in an engine with fixed intake restriction, the volumetric efficiency increases with the compression ratio.

In the 6 $\frac{1}{4}$  x 8 in. engine, operating at its rated power (90 hp. at 950 r.p.m.) the ratio between actual and theoretical compression was found to be 0.82 and the volumetric efficiency 68 per cent.

A number of marked advantages are offered by this type of combustion chamber for Diesel engine use. In the first place, the L-head Diesel combustion chamber greatly simplifies the valve gear and makes the cylinder head a very simple casting, with chances of imperfections and cracking reduced to a minimum. Aside from a reduction in the number of operating parts and a corresponding increase in reliability, the cost of manufacturing an engine of this design is obviously lower than that of an engine with any of the conventional cylinder heads. Another important advantage of this cylinder-head design is that it reduces the overall height above the crankshaft axis to about 80 per cent of that required for the overhead-valve type. This is quite an important item for installations

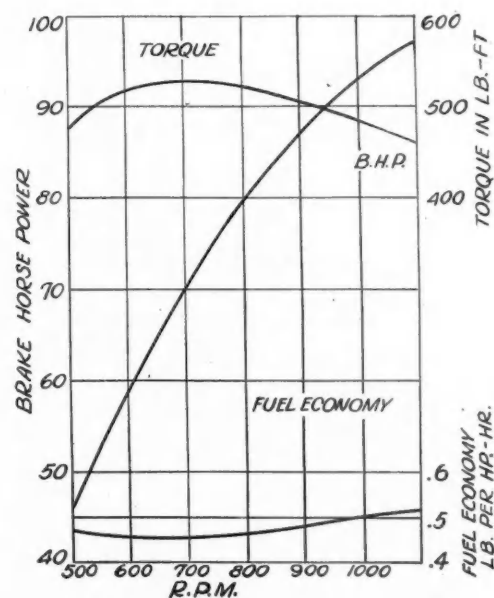


Fig. 3—Horsepower torque and fuel consumption curves (maximum for cleaning exhaust + + +

# L-Head Developed

by Max Hofmann \*

Chief Diesel Engineer, Waukesha Motor Co.

where the head room is limited, as on tractors, boats, switching locomotives, etc. The third and most important feature of this design is the high degree of turbulence that is created in its combustion chamber, a turbulence that is proportional to the engine speed. During the intake stroke a whirling motion is imparted to the incoming air, as indicated by the arrows in Fig. 1-B. Turbulence in the combustion chamber is built up gradually during the compression stroke, and it reaches its maximum during the injection and combustion period. This permits injecting the fuel at relatively low pressures and still get an intimate mixture between fuel and air. Turbulence reduces the time interval between the start of injection and the start of combustion, and accelerates the spread of combustion from the initial flame nucleus throughout the combustion chamber. Reduction of the time lag means better control of combustion and a reduction of the pressure rise per degree of crankshaft travel—that factor which has a most important bearing on the life of an engine.

Fig. 2 shows three typical indicator diagrams of an L-head Diesel engine. The compression pressure is held between 425 and 450 lb. per sq. in., while the explosion pressure stays near 650 lb. per sq. in. It will be noticed that all three diagrams—representing idling, part load and full load performance—show a very gradual pressure rise during the combustion period, a fact which accounts for a smooth-running engine. Diagram No. 4 was taken with a pump timing advanced far beyond the normal setting. It shows that even in such a case the explosion pressure does not rise abnormally, and that a substantial part of the fuel charge can be burned at constant pressure.

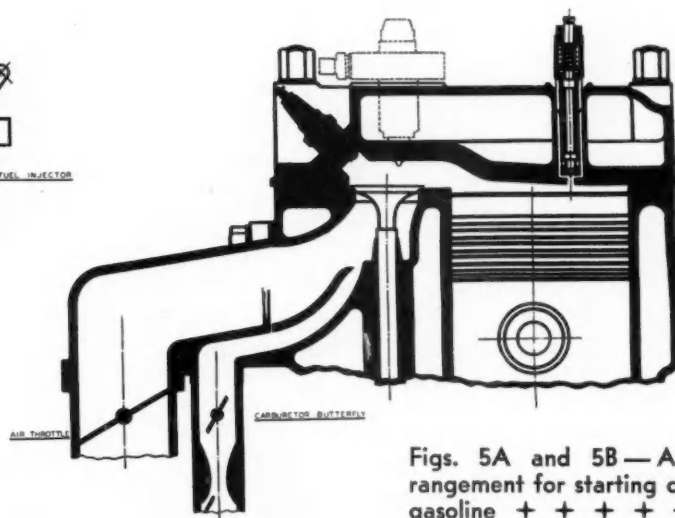
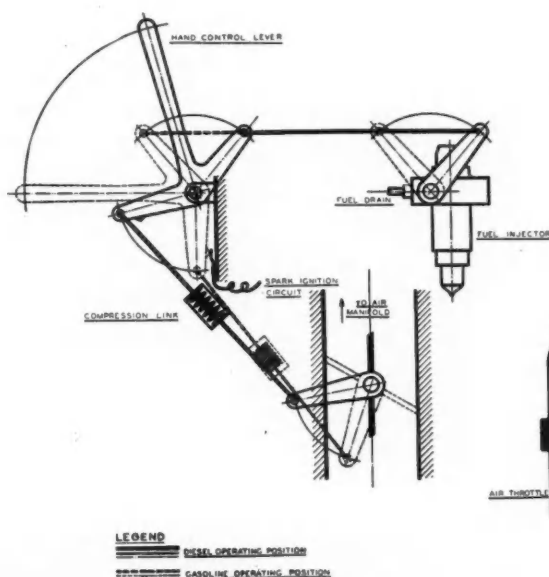
The only real objection that can be raised against

\*Abstract of paper presented at the A.S.M.E. National Gas Power Meeting in Madison.



Fig. 4—Condition of combustion chamber after 600 hours of "smoky-exhaust" operation + + + + +

the L-head Diesel engine, as compared with the conventional overhead-valve design, is its lower volumetric efficiency. It can be shown, however, that this apparent disadvantage is of no importance. While it is true that in a gasoline engine the maximum power output is directly proportional to the volumetric efficiency, in a Diesel engine a new factor—the excess air coefficient—appears. This coefficient represents the ratio between the weight of air per B.t.u. of fuel actually required for clean combustion, and the weight of air theoretically required per B.t.u. Whereas in conventional Diesel engines this ratio rarely drops below 1.5, in this L-head Diesel it was found to be only 1.35, calculating with a volumetric efficiency of 68 per cent, a theoretical air requirement of 1 cu. ft. per 100 B.t.u. of fuel, and a fuel consumption of 0.48 lb. per hp.-hr.



Figs. 5A and 5B—Arrangement for starting on gasoline + + + + +

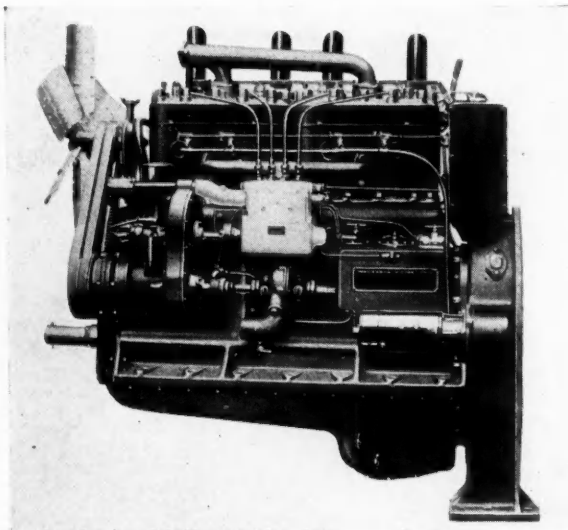


Fig. 6—Pump side of Waukesha Diesel engine + + + + +

at rated load and speed.

That the L-head Diesel requires less excess air than most overhead-valve engines may be attributed to the influence of turbulence on the thorough mixing of fuel and air. It leads to the conclusion that even with a volumetric efficiency 10 per cent below that of a Diesel engine without controlled turbulence, the L-head engine is still capable of developing the same b.m.e.p. with an equally clean exhaust.

Fig. 3 shows the performance curve of the Waukesha type DWL four-cylinder Diesel engine of 6¼ in. bore and 8 in. stroke. The fuel consumption curve is not based on the best results on the test stand, but represents results obtained under normal operating conditions. A higher fuel economy could be obtained with smaller spray holes and a higher injection pressure, but this apparent improvement would result in a rougher engine, a spray nozzle sensitive to clogging and wear, and higher stresses on the whole fuel injection apparatus. Reliability is generally considered of greater importance than this possible slight saving of fuel, because one interruption of service of a few hours duration may cost the engine user more than a year's fuel savings resulting from the difference between 0.40 and 0.48 lb. per hp.-hr.

While the importance of turbulence during the injection and combustion period has received increased attention from designers of high-speed Diesel engines during recent years, to the best of my knowledge, no attention has been paid so far to the effects of turbulence during the exhaust stroke. In installations with rapid load fluctuations, exhaust stroke turbulence has quite an important bearing on the capacity of a Diesel engine to stand up and operate satisfactorily under temporary overloads; that is, under conditions resulting in a smoky exhaust.

The largest demand for the application of high and medium-speed Diesel engines is in such fields as road building and oil field machinery, portable compressors, hoists and logging equipment, locomotives, etc., where there are constant fluctuations between no load and maximum power. I have not seen a single installation of this kind where the exhaust remained clean when the load was applied suddenly. This could be accomplished by simply under-rating Diesel engines for such

intermittent service, but present-day competitive conditions and increasing demand forbid such a course.

The L-head Diesel engine shows a remarkable insensitiveness to operation with a smoky exhaust. The same turbulence that prevails in this engine during the compression stroke exists also during the exhaust stroke, the burned gases being whirled throughout the combustion chamber before leaving by the exhaust port. In this way the settling of carbon particles in the combustion chamber is prevented even with the smokiest engine exhaust. The fact that the exhaust gases have to rush past the spray nozzle tip makes the possibility of carbon craters forming around the spray holes equally remote. Another problem connected with a smoky Diesel exhaust is the gumming and sticking of exhaust valves. This difficulty has been overcome by a suitable shielding of the upper end of the valve guide in combination with provisions for lubricating the valve stem.

An extensive series of tests has been run to substantiate these statements. On one experimental engine operated on a power shovel, the fuel adjustment was intentionally set for an extremely large supply, and consequently a smoky exhaust, and the engine operated in this way for about three months. Fig. 4 shows the appearance of one combustion chamber of this particular engine after about 600 hours of smoky exhaust operation, during which time neither cylinder head nor injection valves had been removed. As can be seen, the smoky exhaust condition did not result in any carbon formation in the combustion chamber; neither was it possible to detect any other signs of distress, such as excessive cylinder wear, bad valve seats, etc. Some carbon was found in the exhaust ports and piping, but it was not enough to affect the engine performance in any way.

Another novel feature of the Waukesha L-head Diesel engine is that it can be started and operated as a gasoline engine with about one-fifth of its normal Diesel power output. Fig. 5-B shows the principle of operation. A butterfly valve in the intake manifold strangles the main air supply, so that the only way air can get into the engine is through a carburetor and passages of very restricted size. The carburetor venturi is so dimensioned as to restrict compression with the operating speed range to that suitable for gasoline operation. At the same time, fuel injection

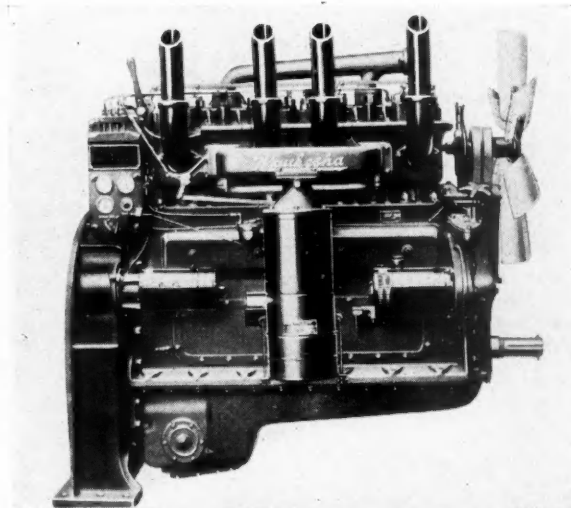


Fig. 7—Manifold side of Waukesha Diesel engine + + + + +



is suspended by the opening of a needle valve in the fuel injector, which by-passes the fuel oil supplied by the fuel injection pump back to the tank. Ignition is effected in the usual way. By means of the linkage shown in Fig. 5-A, the shift from gasoline engine to Diesel operation has been made positively foolproof. Everything is taken care of by the shifting of one hand lever, to which the needle valves of the fuel injectors, the butterfly valve in the air manifold and the ignition switch are connected. Special precautions have been taken to prevent the accumulation of condensed gasoline in the main air manifold. As shown in Fig. 5-B, there is a rib at the junction between the intake manifold and intake port, which serves as a dam and prevents the flow of gasoline back into the main air manifold. The gasket between the intake port and intake manifold is so designed that a small passage is formed in front of the retaining rib, through which any condensed gasoline is drained back into the small gasoline manifold. To eliminate any remaining hazard of excessive explosion pressure, each cylinder (see Fig. 5-B) is provided with a safety valve.

While this engine, with a compression ratio of over 14:1, is cold starting and does not need this auxiliary starting system, it was found that the means for operating it on the Otto cycle, which add very little to the engine cost and complications, offered a good many advantages that will appeal to the experienced Diesel engine operators. It allows the engine to be cranked by hand in an emergency and greatly facilitates cold weather starting. Anybody familiar with Diesel operation, especially in installations where a gravity fuel feed system cannot be used, knows about the troubles arising from air-bound fuel lines. Gasoline starting eliminates this problem entirely. After an engine is started on the Otto cycle, fuel oil is automatically pumped through the whole injection system at atmospheric pressure, ejecting any air present in the fuel lines before the shift to Diesel operation. Gasoline starting also permits inspection of the fuel injection valves on the running engine, by spraying into the open air. While the injectors are mounted in the open, their corresponding openings in the cylinder heads can be closed with simple plugs, and the engine operated on the Otto cycle. And last but not least, gasoline starting may be called a bridge for the mentality of the average gasoline engine operator that leads him over to the understanding of the Diesel principle more easily. In installations where the question of fire hazard and insurance underwriter's specifications prohibit the use of gasoline, the system can be omitted.

The engine was developed from a heavy-duty gasoline engine, the design incorporating a larger number of parts suitable for both types of engines, so that the Diesel shares in the savings resulting from quantity production.

A side view of this new engine is shown in Fig. 6. Robert Bosch fuel injection pumps and injection valves are used, both containing special features necessary to suit the requirements of this engine design.

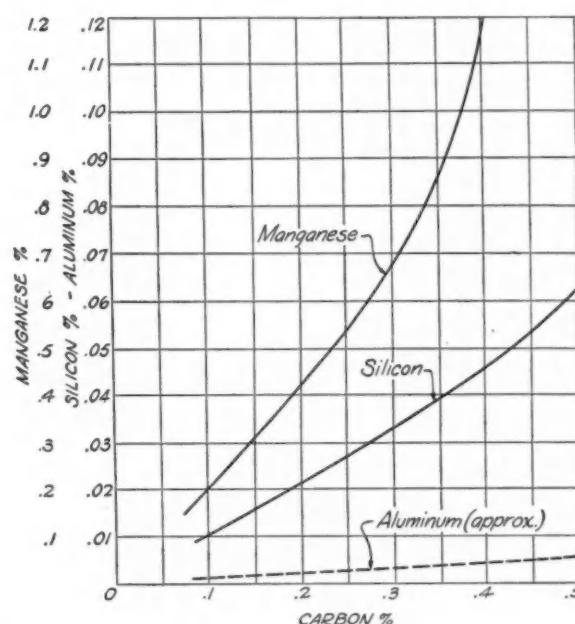
Special attention has been given to a thorough filtering of the fuel oil, not only to prevent clogging of injector spray holes, but mainly to reduce the wear and tear on the closely fitted working parts of the fuel injection apparatus. A self-priming rotary pump forces the fuel through the filters and prevents surging in the fuel supply lines. Relatively large spray holes in combination with triple fuel filtering prevent clogging of nozzles.

A manifold-side view of the same engine is shown

in Fig. 7 illustrating the linkage for gasoline operation described before. The drain lines from the injection valves are led separately through a sight gage on top of the instrument panel so that the fuel supply to each injector can be checked while the engine is operated on the Otto cycle. This sight gage also enables detection and location of any leak that may occur in the injection valves. This photograph also shows near the fan belt a special device acting on the governor, by which the governed engine speed can be varied at will within a wide range. This device was developed for installations which require variable speed operation by means of the so-called remote control.

## Porosity in Arc Welds

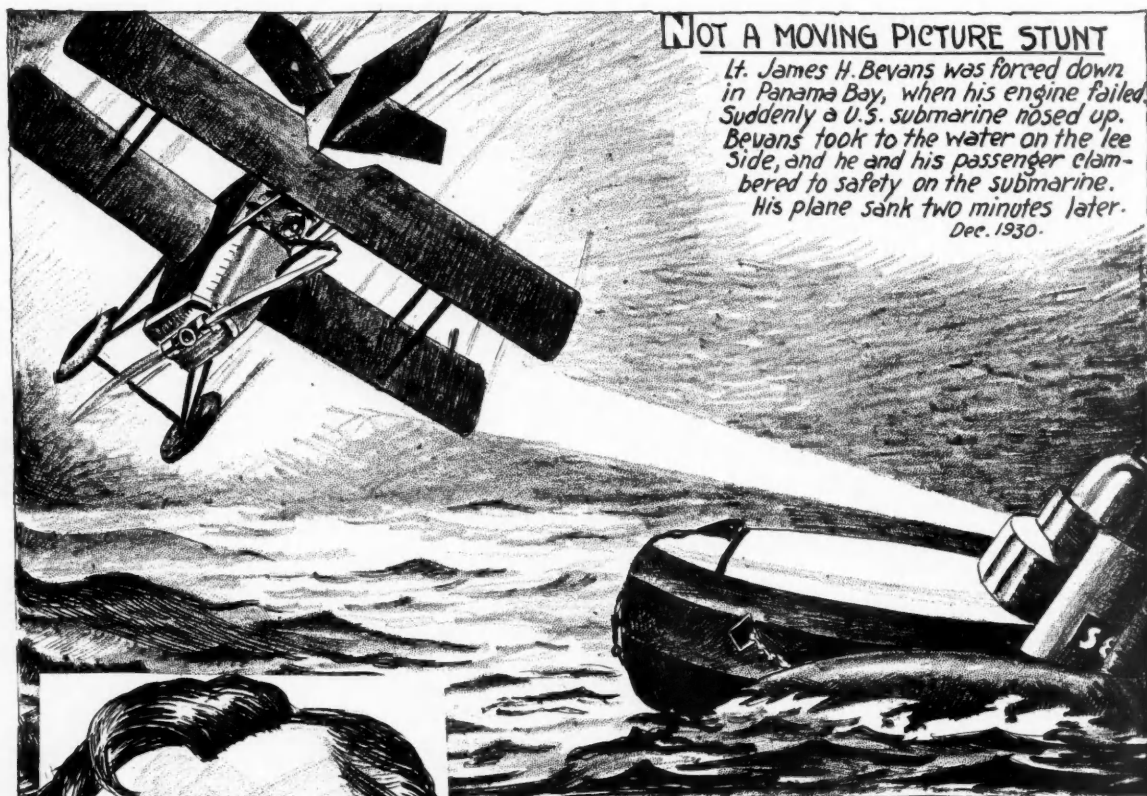
ACCORDING to researches made by Wilmer E. Stine of the Lincoln Electric Co., Cleveland, Ohio, porosity in arc welds is generally due to the nature of the material welded rather than to the process or the electrodes, and he has established what is known as the Lincoln-Stine equilibrium chart for steels to permit of arc welding with a minimum of porosity. All carbon steels contain a certain proportion of silicon and manganese, and Stine has found that for best results in welding the silicon and manganese contents should vary with the carbon content. The equilibrium chart is re-



produced herewith, and its use may be illustrated by an example. Suppose, for instance, that steel containing 0.20 per cent carbon is required; the chart then shows that the proper silicon content is approximately 0.021 per cent and the proper manganese content 0.40 per cent. If the steel has been deoxidized in manufacture by the addition of aluminum, the proportion of this metal present should be not more than 0.002 per cent.

It is said that when steels having a composition in accordance with the chart are arc-welded, there is no chemical reaction, as the temperature drops to the point of solidification of the steel, which is the condition assuring dense welds.

# Automotive Oddities—By Pete Keenan

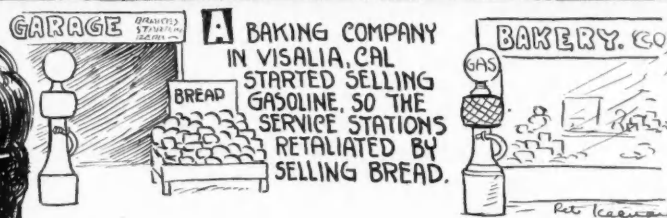


## NOT A MOVING PICTURE STUNT

Lt. James H. Bevans was forced down in Panama Bay, when his engine failed. Suddenly a U.S. submarine nosed up. Bevans took to the water on the lee side, and he and his passenger clambered to safety on the submarine. His plane sank two minutes later.  
Dec. 1930.



IT WAS THE BRAIN OF ALPHONSE BEAU DE ROCHAS THAT FIRST CONCEIVED THE PRINCIPLE OF THE MODERN MOTOR  
FRANCE 1862.

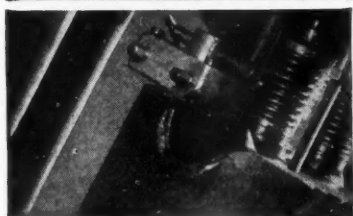


A BAKING COMPANY IN VISALIA, CAL. STARTED SELLING GASOLINE, SO THE SERVICE STATIONS RETALIATED BY SELLING BREAD.



AMPHIBION AUTOMOBILE. WITH WHICH CAPT. G. MALLIN WILL ATTEMPT TO JOURNEY FROM LONDON, ENGLAND. TO CAPE TOWN, AFRICA.





# NEWS

## OF THE INDUSTRY



### A. C. C. Head Seeks Aero Aid

**Says the Industry  
Needs U.S. Support**

NEW YORK, July 4—Pointing out that the military procurement programs of the government have been largely responsible for the stability and engineering growth of the aeronautical industry during the past five years, Charles L. Lawrance, president of the Aeronautical Chamber of Commerce, calls upon the industry to urge the government to extend its five-year procurement program in an article appearing in today's issue of the *Airway Age*. The navy's section of this program, which started in 1927, is already about completed, and the army's program will be completed before the end of next year.

Without further support from the government, the commercial aspects of the industry are insufficient to pay for the engineering development which is necessary for the further advancement of the art, and Mr. Lawrance fears that chaos similar to that which ruled prior to 1926 will again prevail unless the government continues its large purchases of military equipment. How this can be accomplished would be determined by a group of experts, but it would probably call for a balancing of the Air Corps equipment to the personnel, and the enactment of legislation designed to tie in the naval aircraft program with the carrier and deck cruiser construction program growing out of the London Arms Limitation Conference.

### Companies Report

DETROIT, July 1—Hupp June production was 1631, Graham-Paige 1992 against 3785 for May, Reo 1739 against 1737 in May. Chevrolet June production was 84,597, against 78,472 in June last year.

TWO generations ago "Around the World in Eighty Days" was fiction of the highly imaginative kind; yesterday (July 1) around the world in a little more than 8 days was just a memory to a couple of fellows named Post and Gatty: that's how it seems to P. M. Heldt . . . personally we're going back to that old September, 1908, number of the *Century Magazine*, and read the first "exclusive" story of the Kitty Hawk flight by the Wright brothers, which appeared therein, months and months after the flight had taken place . . . this morning the *New York Times* brings the beginning of the exclusive story on the Post-Gatty postscript to the Wrights' effort . . . not alone has flight progressed \*\*\* Monte Heminway, former managing director of the then unified Motor and Equipment Association, has joined with Harry Dickson in a convention management bureau which will manage conventions in a big way . . . 100 E. 40th St., N. Y., if you have any conventions to be managed \*\*\* Phil Shafer, automobile racing driver, left this week on the S. S. New York to participate in the Grand Prize race which will be held in Germany \*\*\* H. W. Kelsy, general sales manager since 1915 of the Russell Mfg. Co., has been placed in charge of the company's purchasing dept \*\*\* the recent meeting of the American Society for Testing Materials had the largest attendance in the history of the organization \*\*\* three first prizes were awarded to Hudson and Essex cars for performance tests held during the annual Gymkhana under the auspices of the Touring Club of Syria \*\*\* polished chromium-plated spokes are now standard equipment on all wire-wheel models of the Graham line, excepting the Prosperity Six \*\*\* Chevrolet has established a permanent truck display of 33 types at 5800 Woodward, Detroit \*\*\* Ford has a new convertible cabriolet with slanting windshield, which the English, with their love of privacy, call windscreen \*\*\* A. V. Hall of the Sherwood-Hall Co. has been appointed vice-chairman of Division C of the Motor and Equipment Association. . . . C. F. Wright, the chairman, who does business in Portland, Ore., finds it difficult to get to meetings \*\*\* the largest self-propelled gas-electric rail car ever built arrived in Chicago this week for service on the A. T. & S. F. lines . . . car by J. G. Brill, Philadelphia, weighs 137,000 lb. loaded, and will snort out of Amarillo, Tex. \*\*\* John M. Bonbright, who handles publicity for Graham-Paige, returned July 1 from a trip, following his marriage on June 11 to Miss Dorothy Vance, daughter of the Rev. and Mrs. Joseph A. Vance of Detroit \*\*\* Century Air Lines and New York Central have established air-rail service between Chicago and New York, reducing time 3 hr. 15 min. under the fastest rail schedules.—H. H.

THE  
NEWS  
TRAILER

### Sales Managers Plan Activity

**N.A.C.C. Group Discusses Current Problems**

DETROIT, July 1—Vigorous selling plans for the next few months, continuance of production schedules, based on retail sales with further strengthening of the dealer situation wherever possible, were considered by the sales managers' committee of the National Automobile Chamber of Commerce at a meeting yesterday, with R. H. Grant, vice-president, General Motors Corp., presiding.

While there is a natural seasonal decline, sales are continuing with manufacturers who have announced that no new models will be forthcoming until the end of the year. Warranties service policies and similar activities mutually beneficial to automobile dealers and manufacturers were reviewed along with very definite recommendation for broadening of a highway safety plan involving the junking of unsafe cars.

One maker after another has joined this plan, under which about 350,000 cars were junked last year, its first period of operation, with small reimbursement to dealer. Besides, approximately 2,600,000 other motor vehicles were junked or went out of use as shown by registration this year over last. The question of pirate parts, bribing of chauffeurs and expansion of promotional work in foreign countries, as handled with talking movies offered by staff men of N.A.C.C., were among other items considered. N.A.C.C. travelers have lectured in 56 different countries meeting dealers, highway commissioners, tax experts, traffic officer, bankers, etc.

### Ford Lends to Detroit

DETROIT, July 1—Ford Motor Co. has lent city of Detroit \$5,000,000 at 3½ per cent for repayment Sept. 15.



## Representative World Cities Automotive Registrations

Cities	Total Automobiles	Passenger Cars and Taxis	Buses	Trucks	Persons per Automobile
Amsterdam .....	12,150	7,800	150	4,200	62
Berlin .....	65,905	48,623	809	16,473	61
Bogota .....	2,652	1,702	234	716	76
Budapest .....	10,392	7,267	308	2,817	97
Chicago .....	469,478	412,166	561	56,751	7
Detroit .....	423,102	381,944	...	41,158	4
Helsingfors .....	6,440	3,950	47	2,443	37
Istanbul .....	2,013	1,694	43	276	347
Lima .....	7,880	5,200	380	2,300	40
Los Angeles .....	516,016	516,016	...	...	2
Milan .....	31,239	23,831	475	6,933	26
New York .....	751,711	632,135	...	119,576	9
Paris .....	172,450	141,100	1,600	29,750	17
Prague .....	11,612	7,969	184	3,459	...
Rosario (Argentina) .....	8,675	5,350	321	3,004	73
Santiago (Chile) .....	11,378	8,399	616	2,963	59
Stockholm .....	17,897	11,284	...	6,613	29
Warsaw .....	7,759	6,135	103	1,521	140

Part of the world census of automobiles, Bureau of Foreign and Domestic Commerce, Automotive Division.

### Automobile Defects Cause Few Accidents

CAMBRIDGE, MASS., July 1—Of all the factors involved in traffic accidents, the automobile itself is least responsible, according to studies recently completed by the Albert Russel Erskine Bureau for Street Traffic Research, in Harvard University. The perfection of the modern vehicle is such that human nature has not as yet adjusted itself to take advantage of its full efficiency.

"Study of over a million accidents reveals that defective brakes caused 3.4 per cent; lack of chains, 1.4; glaring headlights, 1.3; punctures or blow-outs, 1.2, and defective steering gear, lights being out, and all other defects together mounted up to only 3.8 per cent. The entire share of accidents attributable to the car is therefore 11.1. This is on fatal accidents only. In non-fatal accidents, the automobile had defects in only 5 per cent."

### Wants Diesel Research

WASHINGTON, July 2—Still convinced that the United States is behind Europe in designing Diesel engines for propulsion of submarines and other naval vessels, Rear Admiral M. S. Robinson has expressed the opinion that the navy will go to the next Congress and again ask for \$3,000,000 for experimentation with this type of engine. The plan of the navy is to purchase plans of latest improvements made abroad and to encourage construction of Diesel engines by commercial builders in the United States.

### Plans Tool Show

MILWAUKEE, June 30—The Kearney & Trecker Corp. plans to hold a milling machine show in Milwaukee July 15-17. Several hundred executives of other companies are expected to attend the exhibit and elaborate arrangements for their comfort have been made. Demonstrations of tantalum and tungsten carbide milling will be made on new type K & T machines.

chines. Demonstrations will also include use of spindle speeds up to 1500 r.p.m., a step-cut milling feature, a hypoid spiral gear dividing head, a dividing head which divides all numbers up to 500, and a new thread-milling attachment.

### Vehicle Code Use Spreads

NEW YORK, June 29—Twenty states now incorporate one or more of the four acts of the Uniform Motor Vehicle Code, according to a report by Colonel A. B. Barber, Director of the National Conference for Street and Highway Safety. This report was rendered at a meeting of the executive committee held recently at the headquarters of the National Automobile Chamber of Commerce.

Fourteen other states have adopted legislation conforming in many respects to the provisions of this code, Colonel Barber indicated.

The model Municipal Traffic Ordinance, also sponsored by the Conference, has been adopted by at least thirty-eight cities throughout the country, and progress toward similar action has been recorded in fourteen other cities.

The ratio of traffic fatalities has been lowered as much as 25 per cent in some states through the enactment of drivers' license, compulsory inspection, financial responsibility and other model legislation recommended by the Conference, it was reported at this meeting. The greatest progress in accident reduction during the past few years has been made in that class of accidents involving children, the fatality ratio having been steadily decreased by 22 per cent.

### Rubber Shipments Gain

NEW YORK, June 29—Shipments of crude rubber from the Dutch East Indies during May totaled 25,530 tons, as compared with 21,637 tons in April, and with 25,329 tons during May of last year, according to reports received by the Rubber Exchange of New York.

## Defeat Foreseen on Capper-Kelly Bill

### Sentiment Against It Reviewed in Federal Trade Commission Report

WASHINGTON, July 2—Recommendations in the recent report of the Federal Trade Commission to Congress that resale price maintenance legislation is undesirable at the present time, as reported in *Automotive Industries* last week, is generally believed to mean definite defeat for such legislation. Representative M. Clyde Kelly of Pennsylvania, co-author of the Capper-Kelly bill, reacted to the commission report and recommendation with a vigorous statement that this measure would be passed at the forthcoming session of Congress. It is evident, however, that this is distinctly a minority view. It will be recalled that the Capper-Kelly measure was passed by the House last January, but it was so heavily burdened with qualifying amendments that even many of its supporters believe the amendments would virtually nullify the purpose of the bill, even if it had been enacted into law. The bill was not brought before the Senate.

The Commission in its concluding report expressed the view that it would be difficult to provide government regulation of price maintenance that would bring relief to makers of trade-marked goods without injustice to consumers, and would at the same time meet the tests of practical administration.

Of the 691 manufacturers reporting to the Commission in its investigation, 61 per cent expressed no preference as to legalizing resale price maintenance, while 10 per cent as to number of companies and 4 per cent as to volume opposed it. Less than 29 per cent of the total number favored price maintenance. Their average rate of earnings on investments was larger than that of those opposed. A significant fact shown in this connection, says the Commission, is the failure of a majority of the manufacturers making returns to express a preference.

### Traffic Conference Results Published

NEW YORK, June 29—The League of Nations has prepared and distributed a number of pamphlets covering the results of the European Conference on Road Traffic, held last March.

Among the subjects covered are a convention concerning the unification of road signals, a convention on the taxation of the foreign motor vehicles, and a definite agreement between custom authorities in order to facilitate the procedure in the case of undischarged or lost triptychs.

## Increase in Automobile Shipment Tariff Planned by Rails as Part of Program

by L. W. Moffett

WASHINGTON, July 2—The railroads have informed the Interstate Commerce Commission that they are prepared to make an increase of 15 per cent in all existing rates on automobiles. This is their response to the order of the Commission asking the carriers if they intended to make any specific exceptions to the proposed 15 per cent rate increase.

The Commission named automobiles and a number of particular products on which the railroads have recently reduced rates voluntarily. Evidently, the Commission was of the opinion that the railroads might have in mind retention of lowered rates on automobiles and other products rather than intending to increase them on the heels of the decreases. The Commission apparently thought also that by specific elimination of these products shippers of them would not be required to present appearances in the case and that it consequently could be expedited, since the railroads have urgently presented their petition as being of an emergency character and had requested quick action.

But the reply of the carriers that they propose to increase all the rates, regardless of whether or not they covered automobiles and other products on which rates had been cut, indicates that the investigation will consume considerable time. So at the outset, the desire of the railroads for what is termed their desire for "summary disposition" of the case has been defeated. Protests against the proposal of the railroads are accumulating till they have reached the proportion of a large volume also indicate the Commission will not proceed with undue haste but rather will be compelled to throw the record open to all appearances and proceed in the usual manner.

Many of the protests insist not only that the Commission deny the request for increased rates but that it shall not take precipitate action. Some of the protests are from state commissions, especially those in agricultural sections, and particularly protest against increased rates on farm products. Others are from important shippers' organizations. The automotive industry has not entered a protest as yet.

Many think that the motor truck unit of the industry will benefit if increased rates are given the railroads, though there is growing doubt that anything like a flat 15 per cent increase will be granted, if any is authorized. Even a mild increase, many think, would divert additional traffic to motor trucks. On the other hand, in railroad circles there evidently is an opinion prevalent that if the railroads get authority to increase rates, motor

truck lines will also increase rates. This seems to be based on the theory that motor truck lines in schedules provide for "rail rates or less." Nevertheless, the railroad view is met with statements that the motor truck, contrary to increasing rates, will either maintain those existing or possibly further increase some of them in order to get additional traffic from the railroads.

Motor truck competition is discussed at some length in a brief filed with the commission by Wilbur LaRoe, Jr., and Frederick E. Brown, Washington attorneys, representing the North Carolina Traffic League, Southern Furniture Manufacturers' Association, Mathieson Alkali Works, Charlotte (N. C.) Shippers & Manufacturers' Association, and Blue Ridge Corp. The brief pointedly criticizes the railroads for asking for an increase in freight rates and declares that "it is contrary to accepted principles of economics that the price of transportation shall go up at a time when all other prices are going down."

Railroad managers are taken to task for having "shown a minimum of enterprise." Taking up motor truck competition, the protest asserts that the railroads are complacently letting huge volumes of tonnage get away to the trucks, instead of adopting aggressive measures to prevent it. Referring to the statement in the railroads' petition that "the rate structure of the steam carriers is particularly wanting in that flexibility which would enable them to meet this competition," the protest says that no more absurd argument could be advanced.

"It is for the railroads to modify their rate structures in order to give them the required degree of flexibility," it is declared. "If the railroad managers were not lacking in diligence they would long since have reduced short haul rates to meet truck competition; they would have inaugurated efficient and aggressive store door delivery service to compete with the truck; they would have established trucking lines themselves and coordinated them with rail service; they would have transported truck bodies loaded with freight by railroad and delivered them at destination in much less time than the truck can operate over the crowded highways.

"Any industrial traffic man knows that when he approaches a trucking company he is met with a sincere and diligent attempt to obtain the business and to make rates that will get it," it is pointed out, "whereas when he approaches the railroad traffic man he is immediately confronted with the various reasons which prevent the granting of a rate that will move the traffic.

## Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, July 1—The outstanding development during last week was the movement initiated by President Hoover for a moratorium of reparations payments and of intergovernmental debts of the large creditor nations for a period of one year. The immediate effect of this proposal was to stimulate activity in the stock and commodity markets. Everywhere prices of commodities have advanced. There was little or no change in general trade. Retail trade was slow and the activity in the wholesale and jobbing lines was on a small scale.

### INDUSTRIAL ACTIVITY

The index of industrial activity during May, as measured by the consumption of electrical energy by manufacturing plants, was 13 per cent above that in January, but 8 per cent below that a year ago.

### RETAIL SALES

Retail merchandise sales in the United States, which have been measured for the first time in history by the Department of Commerce, amounted to \$53,000,000,000 in 1929.

### CAR LOADINGS

Railway freight loadings during the week ended June 13 totaled 732,453 cars, which marks a decrease of 28,437 cars below those in the preceding week, a decrease of 193,613 cars below those a year ago, and a decrease of 337,217 cars below those two years ago.

### CRUDE OIL OUTPUT

Average daily crude oil production for the week ended June 20 amounted to 2,482,350 barrels, as against 2,463,100 barrels for the preceding week, and 2,598,850 barrels a year ago.

### FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended June 27 stood at 70.3, as against 70.0 the week before and 69.7 two weeks before.

### BANK DEBITS

Bank debits to individual accounts outside of New York City during the week ended June 24 were 33 per cent below those a year ago.

### STOCK MARKET

The stock market became buoyant last week with President Hoover's proposal for a postponement of intergovernmental debt payments. There have been very few other occasions when such broad price advances occurred in such a short period of time. The volume of trading was on a large scale, reaching between 4,000,000 and 5,000,000 shares a day.

### BROKERS' LOANS

Brokers' loans in New York City during the week ended June 24 declined \$13,000,000. The decline in these loans during the ten weeks ended June 24 totaled \$443,000,000.

### RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended June 24 showed increases of \$13,000,000 in holdings of discounted bills and of \$19,000,000 in holdings of Government securities. Holdings of bills bought in the open market declined \$1,000,000. The reserve ratio on June 24 was 84.1 per cent, as against 85.2 a week earlier and 84.4 two weeks earlier.



## Daily Average Gasoline Consumption Increased Sharply During Month of April

NEW YORK, June 30—Gasoline consumption in 47 states and the District of Columbia for the month of April, 1931, as indicated by reports made by wholesalers and dealers in the various states under provisions of the gasoline tax laws or gasoline inspection laws, totaled 1,192,670,000 gallons, compared with 1,212,375,000 gallons in April, 1930, a decrease of 19,705,000 gallons or 1.6 per cent, according to the American Petroleum Institute. Daily average consumption for April,

1931, was 39,756,000 gallons, compared with a daily average of 34,393,000 gallons in March, 1931, an increase in daily average during April of 15.6 per cent.

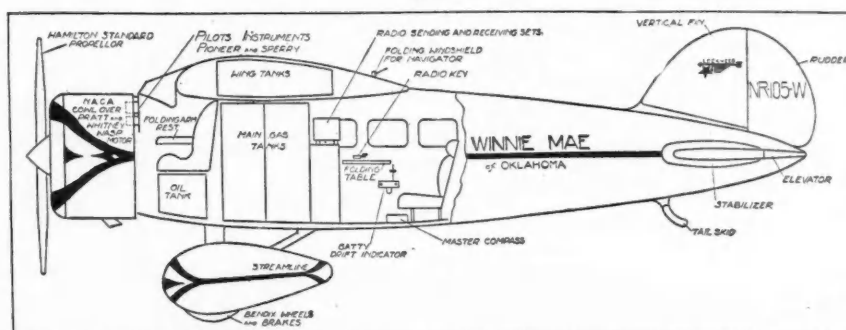
Gasoline consumption in 47 states and the District of Columbia for the four months ending with April, 1931, amounted to 4,196,218,000 gallons, compared with 4,062,436,000 gallons for the corresponding period of 1930, an increase of 133,782,000 gallons, or 3.3 per cent.

### GASOLINE CONSUMPTION BY STATES, APRIL 1931

	Tax per Gallon Cents	Month of				4 Months Ending With—	
		Mar., 1931 Gallons	Apr., 1931 Gallons	Apr., 1930 Gallons	Apr., 1931 Gallons	Apr., 1930 Gallons	
Alabama.....	4	12,979,000	13,949,000	15,316,000	51,004,000	55,738,000	
Arizona.....	5	6,355,000	6,644,000	6,927,000	24,205,000	25,510,000	
Arkansas.....	6	8,511,000	9,939,000	13,306,000	40,324,000	43,188,000	
Colorado.....	4	12,434,000	15,124,000	15,977,000	51,083,000	49,119,000	
Connecticut.....	2	15,020,000	15,700,000	18,476,000	56,766,000	60,753,000	
Delaware.....	2	2,726,000	1,617,000	3,107,000	9,243,000	10,057,000	
District of Columbia.....	6	6,994,000	7,881,000	6,778,000	27,410,000	23,415,000	
Florida.....	6	22,278,000	20,101,000	19,684,000	85,861,000	86,353,000	
Georgia.....	6	17,106,000	17,939,000	19,130,000	67,910,000	70,855,000	
Idaho.....	5	3,886,000	4,908,000	5,295,000	14,644,000	14,769,000	
Illinois.....	3	68,772,000	82,405,000	80,598,000	285,247,000	265,795,000	
Indiana.....	4	32,604,000	42,176,000	(b) 40,133,000	136,453,000	130,277,000	
Iowa.....	3	33,609,000	33,908,000	36,246,000	121,734,000	114,908,000	
Kansas.....	3	25,441,000	29,930,000	32,889,000	106,745,000	111,002,000	
Kentucky.....	5	12,037,000	14,202,000	14,282,000	49,723,000	46,913,000	
Louisiana.....	5	14,064,000	15,613,000	16,490,000	56,625,000	59,046,000	
Maine.....	4	4,808,000	7,662,000	6,965,000	20,760,000	18,426,000	
Maryland.....	4	13,464,000	15,771,000	15,041,000	53,225,000	50,006,000	
Massachusetts.....	3	36,737,000	47,986,000	45,244,000	147,676,000	141,677,000	
Michigan.....	3	53,446,000	67,925,000	68,352,000	220,284,000	219,031,000	
Minnesota.....	3	29,034,000	36,323,000	35,600,000	118,327,000	106,316,000	
Mississippi.....	5	(a) 10,383,000	(a) 11,159,000	12,496,000	(a) 40,802,000	41,619,000	
Missouri.....	2	32,540,000	38,267,000	38,405,000	135,871,000	128,562,000	
Montana.....	5	5,639,000	8,276,000	4,604,000	22,166,000	13,596,000	
Nebraska.....	4	17,307,000	17,284,000	20,180,000	68,620,000	69,670,000	
Nevada.....	4	1,402,000	1,883,000	1,500,000	6,094,000	4,657,000	
New Hampshire.....	4	3,310,000	4,558,000	4,922,000	13,614,000	13,506,000	
New Jersey.....	3	40,827,000	46,531,000	43,655,000	159,305,000	148,760,000	
New Mexico.....	5	3,797,000	4,341,000	4,679,000	15,154,000	15,703,000	
New York.....	2	108,802,000	129,047,000	124,443,000	428,199,000	406,300,000	
North Carolina.....	6	17,393,000	17,337,000	17,828,000	73,339,000	78,370,000	
North Dakota.....	3	7,250,000	13,978,000	17,170,000	32,503,000	29,844,000	
Ohio.....	4	69,168,000	82,462,000	85,068,000	281,750,000	281,768,000	
Oklahoma.....	5	24,277,000	21,262,000	28,300,000	91,592,000	97,100,000	
Oregon.....	4	12,631,000	15,042,000	15,355,000	48,924,000	45,474,000	
Pennsylvania.....	3	73,009,000	66,751,000	57,282,000	282,384,000	261,382,000	
Rhode Island.....	2	7,182,000	7,273,000	7,779,000	25,670,000	24,704,000	
South Carolina.....	6	9,741,000	10,158,000	9,735,000	37,375,000	36,493,000	
South Dakota.....	4	12,793,000	12,669,000	14,377,000	42,002,000	39,636,000	
Tennessee.....	5	15,842,000	16,928,000	18,179,000	61,813,000	61,443,000	
Texas.....	4	62,513,000	66,550,000	66,739,000	244,775,000	243,052,000	
Utah.....	3½	4,566,000	5,514,000	5,847,000	17,356,000	17,196,000	
Vermont.....	4	2,139,000	3,247,000	3,076,000	9,314,000	8,680,000	
Virginia.....	5	16,268,000	19,531,000	19,041,000	65,900,000	63,410,000	
Washington.....	5	29,214,000	18,040,000	25,253,000	80,920,000	76,813,000	
West Virginia.....	4	8,283,000	11,061,000	11,655,000	35,172,000	34,599,000	
Wisconsin.....	4	35,148,000	32,778,000	35,801,000	120,523,000	108,129,000	
Wyoming.....	4	2,457,000	3,040,000	3,170,000	9,832,000	8,816,000	
Total.....		1,066,186,000	1,192,670,000	1,212,375,000	4,196,218,000	4,062,436,000	
Daily Average.....		34,393,000	39,756,000	40,413,000	34,968,000	33,854,000	
Increase over previous year:							
Amount of Increase.....			(d) 19,705,000		133,782,000		
Percentage Increase in Daily Average.....			(d) 1.6%		3.3%		
(a) Estimated. (b) Revised. (d) Denotes Decrease.							

(a) Estimated. (b) Revised. (d) Denotes Decrease.

The "Winnie Mae," high-wing Lockheed Vega monoplane, which carried Wiley Post and Harold Gatty around the world in a little more than 8 days, was powered with a Pratt & Whitney Wasp engine. An engine cowling of the N.A.C.A. type materially added to the speed of the plane and enabled the aviators to set an average of 145.8 m.p.h. during their epoch-making flight. The section drawing at the right shows the position of the extra-capacity gasoline tanks with which the "Winnie Mae" was equipped + + +



COURTESY THE NEW YORK TIMES

## Plane Ends World Flight

Sets Average Speed of 145.8 M.P.H. in Eight-Day Trip

NEW YORK, July 2—Last night at 8.44 p. m., Eastern Daylight Time, Wiley Post, pilot, and Harold Gatty, navigator, set down their Wasp-powered Lockheed Vega monoplane on the historic acres of Roosevelt Field, after a flight of eight days, 16 hours, 51 min., which took them around the world and back to within a few score feet of their starting place. Walter D. Ward, official timer of the National Aeronautic Association, clicked his chronograph as the "Winnie Mae" settled to earth, completing its trip of 15,474 miles.

The high-wing monoplane, "Winnie Mae," took off from Roosevelt Field at 4.56 a. m. on June 23. Its first landing was at Harbor Grace, N. F., where it subsequently took off at 3.28 p. m. of the same day. Later landings in the course of the flight were made at Sealand Airdrome, near Chester, England; Hanover, Germany; Berlin; Moscow; Novo-Sibirsk; Irkutsk; Blagovestchensk; Khabarovsk; Solomon, Alaska; Fairbanks, Alaska; Edmonton, Alta.; Cleveland, and New York.

The fliers spent four days, 10 hours, 8 min. of their trip in the air, making an average actual flying speed of 145.8 m.p.h. A cross section drawing of the layout of the monoplane "Winnie Mae" appears below, with the chief mechanical components used on the record-breaking plane indicated.

## Franklin Completes 30th Year

NEW YORK, July 1—July marks the thirtieth anniversary of the Franklin car. H. H. Franklin, formerly a manufacturer of die castings, employed John Wilkinson, an inventor, to develop an air-cooled engine for horseless carriages in July, 1901. The first model car was completed the following winter.

## Record-Breaking Plane in Section



## Factory List Reviews Changes

**Executive Group Has  
4300 Revisions in  
Total of 7400 Names**

PHILADELPHIA, July 2—Despite the fact that executive personnel in the automotive industry showed more stability during the past 12 months than it did for the similar period of the preceding year, the May issue of the Chilton Factory List, just published, shows 4300 changes out of the 7400 names listed.

During the past year, ended May, 1931, the list shows 137 changes in company presidencies, and in the same period 1114 changes were made in additions to the list of companies, changes in corporate names, names dropped, etc.

More than 1000 factories are represented in the Factory List. Tables showing changes in executive personnel and number of factories listed in the May edition which has recently been circulated follow:

**CHANGES IN COMPANIES IN CHILTON  
FACTORY LIST (May, 1930, to May, 1931)**

Type of Company	Added	Dropped	Name Changes	Address Changes	Other Changes	Total Changes
Automobiles...	8	7	4	12	46	77
Commercial Vehicles...	12	18	3	13	100	146
Buses.....	9	11	2	4	24	50
Tractors.....	4	7	1	2	40	54
Motor Boats...	70	5	4	5	23	112
Aircraft.....	40	85	16	26	187	354
Engines.....	38	40	10	18	114	220
Industrial Equipment..	15	21	7	24	199	266
Net Totals....	178	174	43	90	629	1,114

**CHANGES IN EXECUTIVES LISTED IN CHILTON FACTORY LIST  
(May, 1930, to May, 1931)**

Title of Executive	Auto- mobiles	Motor Truck	Bus	Trac- tor	Motor- cycle	Motor Boat	Air- craft	En- gines	Indus- trial Equip- ment	Totals
Prest.....	18	23	6	12	...	4	38	35	28	137
V. Prest.....	52	61	27	33	1	7	95	81	78	375
Sec.....	19	22	7	11	...	4	57	45	46	181
Treas.....	21	26	7	10	...	4	54	55	54	189
Gen. Mgr.....	42	47	13	8	1	11	48	43	51	214
Works Mgr.....	41	38	13	15	1	5	39	47	51	189
Supt.....	45	60	13	15	1	5	45	40	59	218
Prod. Mgr.....	18	27	10	9	1	4	35	29	40	140
Prod. Engr.....	2	5	3	2	...	3	6	8	6	33
Fur. Agt.....	44	52	11	8	1	10	58	38	54	226
Asst. Fur. Agt.....	16	24	8	5	2	...	19	15	12	81
Service Mgr.....	38	58	13	8	1	3	14	30	23	133
Engineer.....	54	46	15	11	...	6	68	83	68	277
Body Engr.....	12	6	3	2	...	1	2	4	4	23
Tool Engr.....	12	6	2	2	...	1	7	18	10	45
Tool Supt.....	4	8	3	...	...	...	3	4	4	21
Foundry Supt.....	5	4	2	5	...	1	2	19	19	48
Pl. Maint. Engr.....	23	27	5	2	1	1	6	12	10	60
Body Shop Supt.....	20	21	9	...	...	1	2	2	1	35
Trim Shop Supt.....	10	9	5	...	...	...	1	2	1	19
Mch. Shop Supt.....	12	17	6	2	2	3	11	30	20	78
Paint Shop Supt.....	9	16	4	3	1	4	9	5	5	43
Drop Forge Supt.....	4	1	1	...	...	1	...	4	3	10
Metallurgist.....	5	3	1	3	...	...	2	6	12	23
Sales Mgr.....	102	45	28	26	1	7	71	90	84	362
Adv. Mgr.....	26	39	17	13	...	5	40	54	54	199
Other Officers.....	177	124	23	31	...	8	81	96	70	469
Net Totals.....	745	784	226	227	14	75	718	798	788	4,375

### Michigan Sales Off

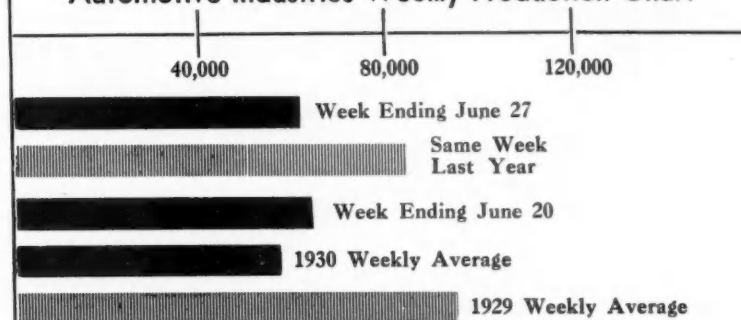
DETROIT, July 1—Automobile registrations in Michigan during May totaled 13,921, a decrease of 245 from total of 14,166 for April, and a decrease of 34 per cent from the total of 21,076 for May last year. Ford, with 4778, represented 33 per cent of the industry and showed an increase of 65 over April and a decrease of 5819 or almost 55 per cent from the total of 10,597 for May last year. Chevrolet totaled 4154, an increase of 72 over the May, 1930, total, and a decrease of 56 from the April, 1931, figure. Pontiac was third on the list with 721; Buick fourth, with 525; Essex fifth, with 512, and Olds sixth, with 452. Com-

mercial registrations totaled 1324, an increase of 33 over April and a decrease of 500 from May, 1930, figure. Ford was first with 765; Chevrolet second, with 330, and International third with 61.

### Heany Forms Company

NEW YORK, June 30—Heany Auto-Transmission Co., with offices at 165 Broadway, has been organized to exploit a transmission for automobiles invented by John Allen Heany. It is said to comprise a combination of electro-magnetic and mechanical clutches so arranged in connection with corresponding gears as to give automatic change of speed.

### Automotive Industries Weekly Production Chart



### Plans Diesel Test Run

COLUMBUS, IND., July 1—The Cummins Engine Co. is equipping a standard truck chassis with a four-cylinder, automotive Diesel-type engine, similar to the one used in a car driven by Dave Evans at the last Indianapolis race, and will send the complete unit across the United States, carrying a pay load, according to an announcement by C. L. Cummins, president of the company. An effort will be made to make the test run as near non-stop as conditions permit. Performance of the engine will be under observation at all times during the trip.

### C. F. Barth Retires

FLINT, MICH., July 1—Today marked the retirement from active service with the Chevrolet Motor Co. of Charles F. Barth, vice-president and director of manufacturing. When W. S. Knudsen became president of Chevrolet in 1924, Mr. Knudsen appointed Mr. Barth to the position he has been holding. A great deal of credit for the phenomenal growth of the Chevrolet organization in the past few years was given Mr. Barth at a dinner in Flint June 27, when citizens of Flint honored his company.

### Wetherald Succeeds Him

DETROIT, July 1—C. E. Wetherald has been appointed general manufacturing manager of Chevrolet Motor Car Co., succeeding Charles F. Barth, who resigned June 30. Mr. Wetherald was assistant general manufacturing manager, previous to which he was factory manager. F. O. Tanner, formerly in charge of manufacturing operations in Detroit and Toledo, was appointed assistant general manufacturing manager of Chevrolet.

### Chrysler Action Upheld

LOS ANGELES, July 1—A decree in the suit started more than a year ago by Frank A. Neveu was entered in the United States District Court holding that narrow profile radiator design and construction used on certain models of Chrysler automobiles does not infringe on Neveu patents.

## Exports, Imports and Reimports of the Automotive Industry For May and Five Months Ended May, 1931-30

	Month of May		1930		Five Months		Ended May	
	1931		1930		1931		1930	
	Number	Value	Number	Value	Number	Value	Number	Value
Automobiles, parts and accessories.....	....	\$14,173,979	....	\$29,169,486	....	\$81,124,567	....	\$161,742,402
*Electric trucks and passenger cars.....	....	6	....	15,271	....	....	28	49,172
Motor trucks and buses except electric (total)	4,498	2,454,146	9,666	6,447,722	24,831	13,202,037	49,714	32,690,046
†Under 1 ton.....	396	132,988	2,428	1,443,825	4,319	1,548,516	20,476	10,963,396
†1 and up to 1½ tons.....	3,562	1,595,269	6,759	3,895,583	17,512	7,970,585	26,857	26,893,938
†Over 1½ tons to 2½ tons.....	296	364,334	479	1,108,314	2,020	2,132,172	2,381	4,832,715
†Over 2½ tons.....	199	321,985	....	....	779	1,423,741	....	....
<b>PASSENGER CARS</b>								
Passenger cars except electric (total).....	5,468	5,516,609	16,876	11,801,440	48,995	29,930,539	96,807	67,977,054
Low price range, \$850 inclusive.....	6,400	3,212,532	12,637	6,609,884	38,708	18,386,825	70,783	35,911,735
†Medium price range, over \$850 to \$1,200.....	1,338	1,296,655	3,628	3,750,864	6,561	6,283,374	22,892	23,704,649
†\$1,200 to \$2,00.....	322	455,170	611	1,440,692	1,676	2,431,493	3,132	7,360,670
†Over \$2,000.....	171	450,155	....	....	926	2,348,600	....	....
<b>PARTS, ETC.</b>								
Parts, except engines and tires.....	....	....	....	....	....	....	....	....
Automobile unit assemblies.....	....	3,048,503	....	5,565,079	....	22,175,429	....	33,309,202
Automobile parts for replacement (n.e.s.).....	....	2,390,594	....	3,976,429	....	12,269,481	....	21,072,372
Automobile accessories.....	....	339,953	....	579,631	....	1,757,423	....	2,938,050
Automobile service appliances (n.e.s.).....	....	306,128	....	756,369	....	1,615,860	....	3,255,021
Trailers.....	36	27,045	222	134,105	464	141,147	832	373,787
Airplanes, seaplanes and other aircraft.....	18	77,957	58	867,918	113	557,417	132	2,042,223
Parts of airplanes, except engines and tires..	....	87,438	....	279,051	....	804,529	....	939,959
<b>BICYCLES, ETC.</b>								
Bicycles.....	154	3,529	562	13,839	774	20,076	1,642	44,774
Motorcycles.....	514	130,267	1,007	240,957	3,571	872,445	7,312	1,674,590
Parts and accessories, except tires.....	....	70,983	....	103,992	....	284,108	....	543,037
<b>INTERNAL COMBUSTION ENGINES</b>								
Stationary and Portable								
Diesel and Semi-Diesel.....	7	17,992	34	108,921	146	153,021	144	389,976
Other stationary and portable								
Not over 10 hp.....	690	48,550	2,515	192,488	4,198	326,932	12,184	974,171
Over 10 hp.....	1,375	521,912	757	370,903	2,611	1,210,633	2,649	1,468,089
Automobile engines for:								
Motor trucks and buses.....	1,027	155,616	1,580	132,201	3,912	575,774	18,837	1,506,609
Passenger cars.....	2,717	205,868	6,008	558,801	11,482	967,206	30,347	2,791,832
Tractors.....	3	1,101	35	14,354	8	3,503	141	62,040
Aircraft.....	....	....	42	244,190	....	....	128	609,175
Accessories and parts (carburetors).....	....	188,822	....	364,716	....	1,059,037	....	1,736,308
<b>IMPORTS</b>								
Automobiles and Chassis (dutiable).....	75	106,400	52	91,615	249	339,179	210	364,584
Other vehicles and parts for them (dutiable)	....	4,857	....	48,634	....	25,440	....	129,039
<b>REIMPORTS</b>								
Automobiles (free from duty).....	9	3,275	14	15,179	74	67,760	112	95,491

\* Not shown separately after 1930.

† Classification changed beginning January, 1931.

### Plans Rate Hearings

WASHINGTON, July 2—The Interstate Commerce Commission has asked protestants against the proposed 15 per cent rate advance asked by the railroads to notify it of intention in the matter on or before July 20, five days after the date of the initial hearing, July 15, to begin in Washington. At this proceeding the railroads and those supporting its petition will be heard.

Other hearings, beginning Aug. 31, will be held for the further cross-examination of the witnesses presented at the first hearing, and for the submission of evidence by protestants.

### Mullins Books Two Orders

CHICAGO, June 29—Mullins Mfg. Co. has received contracts from two automobile manufacturers for body stampings amounting to approximately \$1,250,000.

### Material Prices Drop Farther

NEW YORK, July 1—The composite prices of automotive raw materials declined slightly during the month of

June, according to the monthly index of raw material prices compiled by Ray B. Prescott for *Automotive Industries*. In the middle of the month the index stood at 94, compared with 95 for the middle of May, and with 107 in June, 1930. The Bradstreet index of general raw material prices stood at 97 for the month of June, 1931.

### Dodge Adds Division

DETROIT, June 29—Dodge Brothers Corp. has announced the organization of a Service Promotion Division to assist dealers in building up service business. David G. Nimmo will head the division as service promotion manager and E. C. Ford will act as his assistant.

### Speed Record Broken

PARIS, June 20 (by mail) — The world's 23-hr. road record was broken in the ninth annual Le Mans 24-hr. race, when a supercharged, eight-cylinder Alfa Romeo car, driven by Lord Howe and Sir Henry Birkin, covered a distance of 1875 miles, thus averaging 78 m.p.h.

### Mexico Penalizes Radio

WASHINGTON, July 2 — A Mexican presidential decree, effective June 28, increased by 30 pesos each the duty on automobiles of all kinds, equipped at the factory with radio apparatus. In addition to the basic duty, the usual surtax of 3 per cent applies.

### Perfect Circle Exports Gain

CHICAGO, June 29—Sale of Perfect Circle Piston Rings for export purposes during the first five months of 1931 established an all-time record. Sales for the period showed a gain of 71 per cent over the first five months of 1930, according to W. J. Platka, export manager.

### Delivers Herrington Units

INDIANAPOLIS, June 29—The Marmon-Herrington Co., Inc., subsidiary of the Marmon Motor Car Co., today delivered to the U. S. Army 33 four-wheel-drive trucks, with a value of approximately \$100,000, to be used at Army air fields for airplane refueling units.

## May Output Drops 20,593

Census Figures Show It That Much Below April

WASHINGTON, July 2—The May production of motor vehicles in the United States totaled 315,115 units, a decline of 20,593 under April, according to the Bureau of the Census. The output of passenger cars decreased 15,948 to 269,080, while motor truck production showed a decline of 4320 to a total of 45,695. The taxicab output was 340 compared with 665. In the first five months of the current year, the production of motor vehicles was 1,319,016, a drop of 544,859 under the corresponding period of 1930. Passenger car output was 1,102,637, a decrease of 472,251, while the motor truck production was 215,923, a decrease of 71,098. The production of taxicabs declined to 2456 from 4165.

The May production of motor vehicles in Canada was 12,738 compared with 17,159 in April. The passenger car output declined to 10,621 from 14,043, while the production of motor trucks decreased to 2117 from 3116. In the first five months of 1931, the motor vehicle output totaled 59,257, as against 95,595 in the corresponding period of last year. The passenger car output was 47,228 compared with 81,165, and motor truck production was 12,029 compared with 14,430.

## Fokkers Returned to Service

NEW YORK, June 29—The Department of Commerce has approved, for reentry in the passenger-carrying service, 20 of the 36 Fokker tri-motor planes which were temporarily withdrawn as unairworthy, but have since been reconditioned. There are five others in the process of being reconditioned, and will shortly be submitted to the Department for improvement.

The remainder of these planes may or may not be reinstated, depending on the reaction of their owners in undertaking to recondition in accordance with the requirements of the Department.

## Bendix Plans New Devices

CHICAGO, June 29—Bendix Aviation Corp. will shortly announce three new products for the automotive trade, a new vacuum tank, a chassis lubricating system and a new transmission with novel improvements in gear shifting and free wheeling. Considerable importance is attached to the sales possibilities of the new products, and it is understood that formal announcement will be made after stockholders have been notified of their nature and significance.

## + + CALENDAR + + OF COMING EVENTS

### SHOWS

International Garage Exposition, Berlin, Germany ..... May 9-Aug. 9

### CONVENTIONS

Southern Automotive Jobbers, Asheville, N. C. .... July 20-22

S.A.E. Aeronautic Meeting (in conjunction with Natl. Air Races), Cleveland, Ohio ..... Sept. 1-3

Eastern States Exposition, Springfield, Mass. .... Sept. 20-26

American Welding Society, Boston, Mass. .... Sept. 21-25

American Electric Railway Assn., Atlantic City, N. J. .... Sept. 26-Oct. 2

S.A.E. National Production Meeting, Detroit ..... Oct. 7-8

National Safety Council, Chicago, Ill. .... Oct. 12-16

Society Industrial Engineers, Pittsburgh, Pa. .... Oct. 14-16

Transportation Meeting, S.A.E., Washington, D. C. .... Nov. 10-12

American Roadbuilders Association, Detroit, Mich. .... Jan. 11-14, 1932

## Opens Bumper Plant

DETROIT, MICH., June 30—Operations were started recently in the new bumper manufacturing plant of the Chevrolet Motor Co., W. S. Knudsen, president and general manager of the company, announced today.

Construction of the new plant, which has a total floor space of 35,000 sq. ft., was started early this spring and completed last month. Included in the mechanical installations are several innovations designed to facilitate the handling and fabrication of material.

The plant has an average monthly capacity of 70,000 sets of bumpers, Mr. Knudsen said.

## Develops Electric Truck

NEW YORK, June 29—Ward Motor Vehicle Co., Mt. Vernon, N. Y., has developed a new high-speed model electric truck. The high speed is obtained by the use of a new motor and different gear axle ratios.

This new truck makes no departure from standard battery sizes and conforms with all Ward models in being of conventional design and using standard parts throughout.

## Goodrich Salesmen Confer

AKRON, June 30—Truck and bus tire salesmen of the B. F. Goodrich Co., from all parts of the country, were in Akron for a conference June 22-26.

## Willys Adds New Knight

Free Wheeling Will Be Optional On Company's Whole Line

NEW YORK, June 29—Free wheeling as optional equipment, at an extra cost, will be available on all Willys' cars shipped after July 1, George M. Graham, vice-president of Willys-Overland, told metropolitan dealers at a special meeting at Hotel Commodore today.

This free wheeling will cost \$50 extra on the more expensive models and \$35 extra on the less expensive model.

Mr. Graham also announced an addition to the Willys line in the form of a new low-priced Knight car to be known as Model No. 95. This new car resembles closely the Model No. 66D, except that it is smaller in size. It also incorporates a number of mechanical improvements worked out since the original introduction of the 66D.

The car will be priced at \$895 for the sedan and victoria; \$845 for the coach and \$875 for a special five-window coupe.

## China Plans Roads Show

PHILADELPHIA, June 30—The National Good Roads Association of China will hold a Good Roads Exhibition at Shanghai, China, Sept. 12-Oct. 2, 1931. Exhibits of all types of motor vehicles and accessories will be provided for, in addition to exhibits of all devices and services pertaining to the construction, maintenance, and administration of highways. S. U. Zau is chairman of the exhibition executive committee and S. C. Kingsbury is foreign executive secretary.

The exhibition maintains offices at 16 Jinkee Road, Shanghai, China. A number of copies of booklets explaining the purposes of the exhibition and cost of space are in the possession of *Automotive Industries* and will be forwarded on application from interested parties. The publication, however, can assume no responsibility in this connection.

## Show Blanks Mailed

NEW YORK, June 29—The Joint Trade Show operating committee of the Motor and Equipment Association and the National Standard Parts Association has mailed out to the members of the associations application blanks for space, together with data on the rates and various types of service available and a floor plan of the show, to be held in Atlantic City, December 7 to 12.



## Men of the Industry and What They Are Doing

### Studebaker Names Brooks

The appointment of M. S. Brooks to the position of assistant sales manager of the Studebaker Corp. of Canada, Ltd., Walkerville, has been announced. Mr. Brooks succeeds G. F. Mackay, who recently resigned to become managing director of the Thor (Canadian) Co., Toronto.

### Indian Names Bouton

The Indian Motorcycle Co., Springfield, Mass., has announced the appointment of W. Stanley Bouton as assistant sales manager. Mr. Bouton joined the Indian organization in July, 1919.

### Russell Elects Shibley

Russell Mfg. Co. has elected Fred W. Shibley, vice-president of the Bankers' Trust Co. of New York, as a director, according to an announcement by J. MacDonough Russell, president.

### DeLargey is Shifted

L. F. DeLargey, general purchasing agent of the Wilcox-Rich Corp., whose headquarters has been at Saginaw, Mich., has been transferred to the corporation's general offices in Detroit.

### Chambersburg Elects Clark

At a meeting of the board of directors of the Chambersburg Engineering Co., Eugene C. Clark was elected president, to succeed William Herbert Derbyshire, Jr., who becomes chairman of the board. Arthur G. Dickson was elected a vice-president of the company.

### Pierce Names Kelley

The appointment of Harry Kelley as Pierce-Arrow Buffalo district sales representative was recently announced by T. L. Preble, sales manager of the truck division of Pierce-Arrow.

### White Names Rogers

R. L. Boughton, vice-president of the export region of the White Co., announces the appointment of Walter S. Rogers as export service manager. Mr. Rogers succeeds V. B. King, who has been transferred to the new Canadian plant of the company at Montreal, Que.

### Sylvanus Returns to U. S.

C. M. Sylvanus, special representative for the Studebaker Pierce-Arrow Export Corp. in South Africa, arrived at the corporation's home offices last

week for a two months' stay in the United States. Mr. Sylvanus, who has been in charge of Studebaker business in South Africa for the past five years, will return to his territory in September.

### Auburn Ships 3205

AUBURN, IND., July 1—Auburn Automobile Co. shipped 3205 Auburn and Cord automobiles in June, compared with 6717 for the month of May and 950 for June, 1930. June was an extremely satisfying month for the company, according to R. H. Faulkner, president, in view of general conditions and the fact that registrations will exceed the number of shipments by a substantial figure.

June shipments bring Auburn production for the calendar year up to 27,660, which is more than twice as many cars as shipped during the entire year of 1930 and 5193 more than the number of cars shipped in the company's peak year of 1929.

All stocks of cars in distributors' and dealers' hands have been materially reduced, he said, and reports from the field indicate that there is an average inventory amounting to 2½ cars per dealer. During June, Auburn added 156 new dealers, which brings the total number of new dealers added since January to more than 800.

### Chrysler Lines Offer Free Wheeling Option

DETROIT, June 29—Free wheeling is now available on the De Soto Six and Eight, Dodge Six and Eight and the Chrysler Six at \$20 additional cost. The unit is similar in design to that provided on the new Plymouth. Public announcement is scheduled for July 12.

### National Air Tour On

DETROIT, July 4—The 1931 National Air Tour for the Edsel B. Ford Reliability Trophy was to leave the Dearborn airport today for a 22-day tour of 18 states and one Canadian province. About 30 airplanes were to participate, including 20 official entries. Ray Collins is managing the tour.

### Adds Long Base Types

DETROIT, June 29—Federal Motor Truck Co. recently has developed two models with 168 in. and 163 in. wheelbases for the mounting of 11½ ft. and 12 ft. bodies. Before the development of these new types, the longest wheelbases available on these Federal models were 151 in. and 156 in.

## New Sheet Price Formally Effective

### Revised System of Quotations and Differentials Meets Acceptance

NEW YORK, July 2—Prices for steel sheets based on the new classification became effective with the turn of the month. According to the formal announcement of the new schedules made some time ago, deliveries at the old prices will not be made after Aug. 1. The new schedules provide a 2.40-cent price for common black, compared with the prevailing range of 2.15 @ 2.25 cents, Pittsburgh, and for a 3.10-cent, Pittsburgh, base price for full-finished automobile sheets, for which the current market is 3.00 @ 3.10 cents.

The status of blue annealed sheets is not changed except for the nomenclature. Whether the advances can be maintained remains to be seen, but there is unanimity that the new system of quotations and differentials will meet with general acceptance. Current mill operations show very little change. In all departments of the steel market other than sheets prices come in for very little mention. Bolt and nut manufacturers now recognize the 10 per cent extra discount which has been in vogue for some time unofficially and have announced the regular discount rate as 70 and 10 per cent in place of 73 per cent, which has become strictly nominal.

Following the rather hectic period of one price advance after another in the leading non-ferrous metals last week, somewhat more quiet conditions prevail, but on the whole the higher levels have been fairly well maintained. It is recognized that prices had declined to so abnormally low levels that any sign of betterment in the general business situation was bound to have the effect which the response of the commodity markets in general to the announcement of the proposed reparations holiday did.

Whatever the future course of the international situation may be, some of the gains scored by non-ferrous metal prices are expected to stick, and there is a very definite feeling in the market that the record lows of this record year for lows have been safely left behind.

**Pig Iron**—While sentiment is rather cheerful and more optimism prevails regarding the outlook, business for the present is just dragging on. Automotive foundries are only buying routine lots as they need them to fill in. Prices are unchanged.

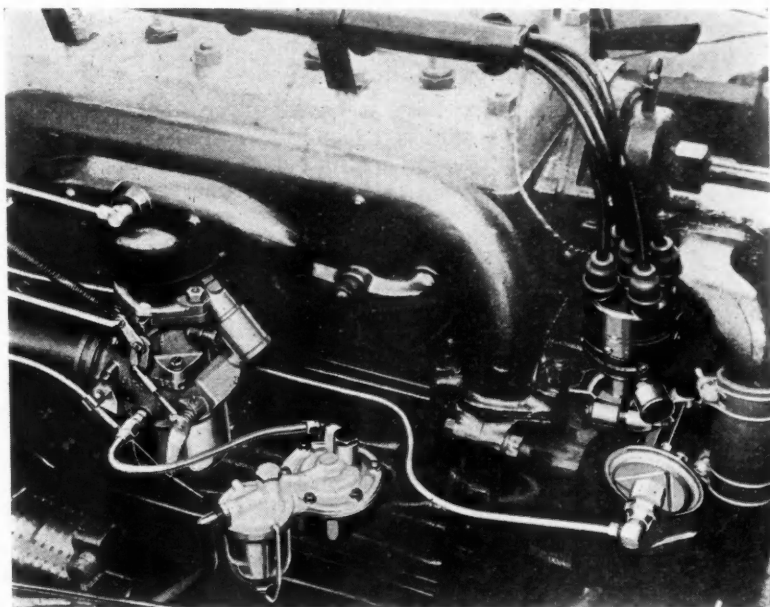
**Aluminum**—Automotive demand is light. Prices are unchanged.

**Copper**—In some quarters improved market conditions are reported to have led to a change of attitude toward further curtailment of output. Total sales to domestic consumers in June are believed to have reached a total of 150,000 tons, together with 72,000 tons booked for export, constituting one of the heaviest buying movements in recent times. The market opened on Monday firm at 9 cents.

**Tin**—This mercurial metal was the first to feel the reaction from the uptrend.

# Engine on New Plymouth is Cradle-Mounted

(Continued from page 13)



Showing diaphragm chamber used for spark control, the chamber being connected by a tube to the carburetor mixture chamber above the throat + + + +

the gearshift lever, when gears are being shifted, and in the case of the brake lever, when the brake is being applied. The accelerator pedal is located at the neutral point, so that no movement will be transmitted to it by engine movement. The gearshift lever is provided with a rubber cover over the ball housing, which helps to prevent vibrations of the lever itself from other influences.

Plymouth's free-wheeling unit is of the roller-clutch type, located and built in at the rear of the transmission. The latter has been changed to a constant-mesh, spur-gear design for easy shifting in connection with the adoption of the over-running clutch. The control for the free-wheeling unit is located on the dash, from where the locking-out mechanism is operated through a Bowden wire. The free-wheeling unit, it is stated by the factory, is a Chrysler development, built by the Chrysler organization. As will be noted from the sectional drawing, there are three sets of three rollers each in the over-running clutch, located between an outer ring and inner unit having three cam surfaces. Bronze plugs under spring pressure keep the rollers in position for rapid engagement whenever the throttle is depressed and torque is applied.

The lock-out mechanism consists of a simple toothed or jaw clutch consisting of external teeth cut on a shifting collar splined to the rear end of the transmission shaft and internal teeth cut on the outer case or ring of the free-wheeling clutch, which is formed integral with a splined shaft carrying the transmission brake drum and universal joint companion flange. This latter shaft is supported within the transmission case

proper by a ball bearing just back of the tachometer drive and a roller bearing between the inner and outer members of the over-running clutch at the rear end of the transmission mainshaft.

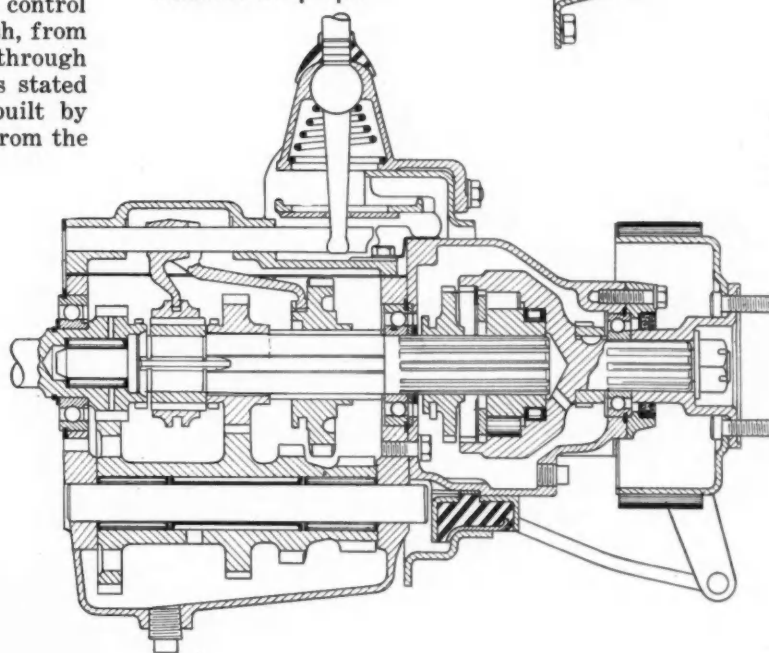
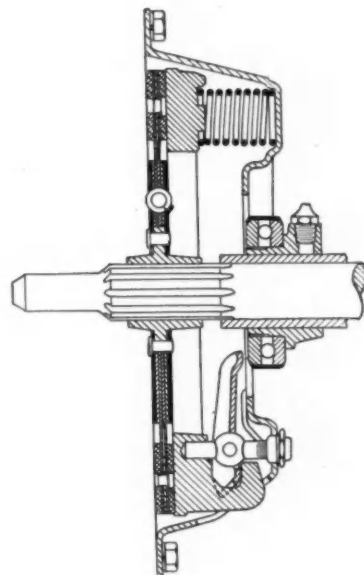
The actual shifting of the lock-out collar is through an additional shifter rod located in the top of the transmission case, this rod being hollow at one end and provided with a compression spring to assist in returning it to the free-wheeling position. The dash control is pulled out to lock the car in normal engagement, and pushed in to free wheel.

Free wheeling, of course, is available in all forward speeds, and the use of the clutch is required only

(Turn to page 34, please)

Right — Sectional view of new friction clutch which contains a double-disk driven member, each disk carrying a friction lining on one side only + +

Below — Section of the new constant-mesh transmission, the free-wheeling unit being shown inclosed in a housing to the right of the transmission proper





when starting up or reversing. An automatic lock-out is provided so that when the transmission is shifted into reverse the free-wheeling clutch will be automatically locked out. To return it to free wheeling, it is unnecessary to again push in the dash control, as it is also automatic. Direct and second speeds are engaged by a sliding jaw clutch. Alternate teeth are undercut for easy shifting even when speeds are considerably out of synchronism.

The third feature used on the new Plymouth, the vacuum-controlled spark advance, is related directly to free wheeling, since its major purpose is to prevent engine stalling. To achieve this a secondary control is superimposed on the centrifugally operated automatic spark advance provided in the distributor.

A wire connection is provided between the "manual advance" lever on the distributor and a diaphragm chamber connected to the carburetor riser directly at the throttle. In an accompanying illustration a cut-away view of the diaphragm chamber is shown. It is provided with a compression spring to immediately retard the spark when the carburetor vacuum drops below a certain figure, immediately upon the throttle being closed for idling. This permits the use of a larger throttle opening for idling conditions without a consequent increase in engine revolutions at the idling setting.

When the engine is started, both the centrifugal and vacuum controls maintain the distributor in the fully retarded position. When the engine attains a speed equivalent to about 6 or 7 m.p.h., the vacuum control advances the distributor to the full "manual advance" position automatically. From here on the centrifugal

advance control mechanism carries the advance along the maximum torque curve for full power operation. If the car is in the free-wheeling position and the foot is lifted from the accelerator, the carburetor vacuum drops, retarding the spark, and as the engine speed drops the spark is further retarded gradually by the centrifugal control.

### Other Plymouth Changes

Frames now have a double drop; the maximum depth of the side rail has been increased from 5 to 5½ in., and the flange width increased ¼ in., to 2 in.

The compression ratio has been increased from 4.6 to 4.9 to one, resulting in a horsepower increase to 56 hp. at 2800 r.p.m. An increase in piston-head thickness has reduced the detonating tendency. An air cleaner has been adopted on the Carter carburetor, a 5/32 in. double-slot oil ring is now used (for better oil control), and an extra compression ring has been added.

The second-speed ratio is somewhat lower than formerly (1.51 instead of 1.79), for easier and quicker getaway in this gear. The steering gear ratio has been increased to 13.5 to one, the caster angle reduced to 1 deg., and the camber angle reduced to 1½ deg.

A further important development on the new Plymouth is in the clutch. Two driven plates are used, with lining riveted to the outside faces only. These two plates are fastened to the clutch center and are held apart at the outer periphery, where the lining is attached, by small flat springs between them. The design provides for smoother engagement. An engine temperature indicator has been added on the dash.

## Hamilton Press Helps Murray Mfg. Co. Production

**D**URING the past months, the heavy stamping and frame division of the J. W. Murray Mfg. Co., a subsidiary of The Murray Corp. of America, through the purchase and installation of modern high capacity machine tool and other equipment, has become a factor to be considered in the automotive frame and heavy stamping field.

Among the most recent acquisitions of this company is one of the largest frame forming presses in existence, capable of forming simultaneously two frame side rails of ¼-in. stock and up to 220 in. in length. The press, a Hamilton, is rated at 2000 tons capacity and is driven by a 100 hp. high torque motor, operated through magnetic clutches working on DC current. For the latter a special generator is provided.

The press has a length between uprights of 220 in., a stroke of 16 in. and a 62-in. wide bolster plate. It weighs 450 tons assembled and rests on the usual reinforced concrete foundation supported by 32 45-ft. pilings. The press operates on a seven stroke per minute cycle.

For safety it is equipped with eight starting buttons, requiring that each of the four attendants have both hands on the controls before the press can be started. There are no levers or other operating mechanism.

In assembling frames, Murray Stamping tacks the side rails and cross-members together with knurled rivets to prevent their dropping out. Following the completion of assembly, the frame is hung on a conveyor which takes it through the washer, the enameling dip, and oven, delivering it onto a table type moving conveyor on the loading platform without manual han-

dling at any point. This conveyor is designed to handle 353 lb. frames.







## More than reamers , , , these are Barber-Colman Reamers

Today there are two kinds of reamers available for your use: Those that are merely reamers—nothing more—and Barber-Colman Reamers. The man on the machine knows the difference. Ask him!

A reputation for quality is too hard to build to permit it to be entrusted to less than the very best we know how to produce. That is why Barber-Colman Reamers are much more accurate and far more carefully made than ordinary reamers selling for comparable prices.

We make Reamers in two types—Fluted and Inserted-tooth. Each of these types is furnished in a number of different styles that practically

cover the requirements of present-day reaming practice. Both fluted and inserted-tooth types possess distinctive Barber-Colman characteristics. The former have flute lengths and tooth cross sections which are individual to Barber-Colman Reamers. The inserted-tooth type also has an easily-identified Barber-Colman characteristic in the style of blade mounting.

Because both the predetermined spacing and spiral angle of these reamers are in step with the Barber-Colman Reamer Sharpening Machine, unusual results as to accuracy and economy may be expected when this Machine is used in combination with Barber-Colman Reamers.

### BARBER-COLMAN COMPANY

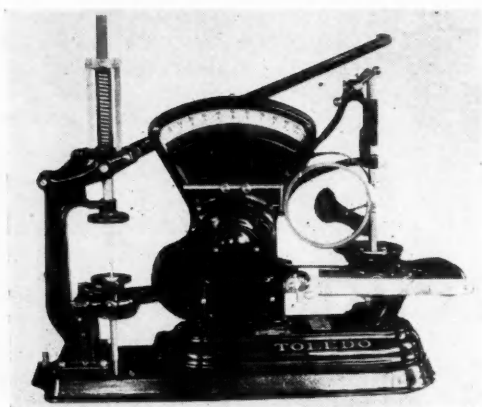
General Offices and Plant

ROCKFORD, ILLINOIS, U. S. A.

# NEW AUTOMOTIVE DEVELOPMENTS

## Piston Ring and Valve Spring Auto-Gage

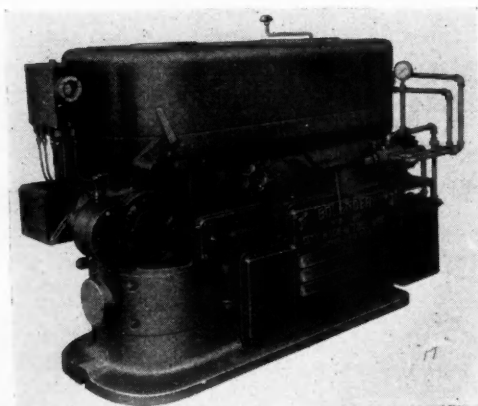
A COMBINATION Piston Ring and Valve Spring Auto-Gage has been placed on the market by Toledo Precision Devices, Inc., a subsidiary of the Toledo Scale Company, Toledo, Ohio. This machine is designed to compare the strength of Piston Rings and to gage the compression strength of valve springs. The Auto-Gage is adjustable to any size



piston ring. When the ring is in place and the lever compressed, the resistance of the piston ring is read directly from the chart, using the bottom black figures. To gage a valve spring, slip the spring over the removable spindle after the proper adjustments have been made and bring the long handle down against the stop. The compression strength of the spring is then read directly from the red upper line of figures on the chart.

## City Bolender 2-H Hydraulic Gear Burnisher

THE City Machine & Tool Works, Dayton, Ohio, announces the Bolender Model 2-H Gear Burnisher, utilizing hydraulic pressure. The previous air operated Model 2 will continue to be a regular product, for those gear plants which desire greater uniformity,

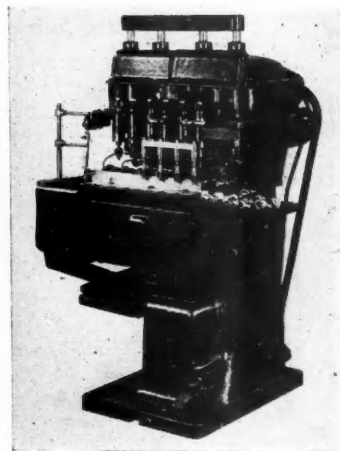


plus the cushioning action of hydraulic pressure. The 2-H machine is completely automatic. All that the operator is required to do is to load the gear, throw the control lever turning on the hydraulic pressure, and press a single push button. The gear will be revolved under hydraulic pressure a given number of revolutions in one direction, will automatically reverse and revolve an equal number of revolutions in the opposite direction, and then automatically stop. The number of revolutions which the gear can be burnished in each direction can be quickly varied from approximately three to 30 revolutions in each direction. The machine is available for mounting of master burnishers either with bronze bearing or roller bearing mountings and has a capacity up to 14 in. O. D. gears, which can be increased to 25 in. O. D. at slight additional cost. Operation is extremely fast and set-up requires a minimum of time.

## Globe Drilling and Tapping Machine

A COMBINED drilling and tapping machine has been added by the Globe Tapping Machine Co., Bridgeport, Conn. This machine shows a standard conveyor table but can also be furnished with dial or push feed tables. The machine shown is built for drilling four holes (size No. 36 drill)  $\frac{1}{4}$  in. deep in a die casting and tapping of two holes (size 6 x 32 tap) at a rate of 30 finished pieces per minute.

The parts are loaded onto the fixtures and the ejection is done automatically. Fixtures are mounted on conveyor links and made to index the parts 90 deg. when the conveyor is indexed. By this arrangement holes can be drilled and tapped at any angle on the periphery. The fixture shafts are arranged with sprockets and turn against stationary pins on the table. A spring plunger stops the fixture at the desired angle and the guide bushings for the drills are also arranged to clamp the parts when the drilling is done.



One spindle slide is arranged with drilling spindles and one with tapping spindle permitting using the maximum allowable time for drilling. This is accomplished by using a cam feed for the drill with a long lead and quick raise and working independent from the slide with the tapping spindles. All spindles are adjustable and positively driven through spur gears.

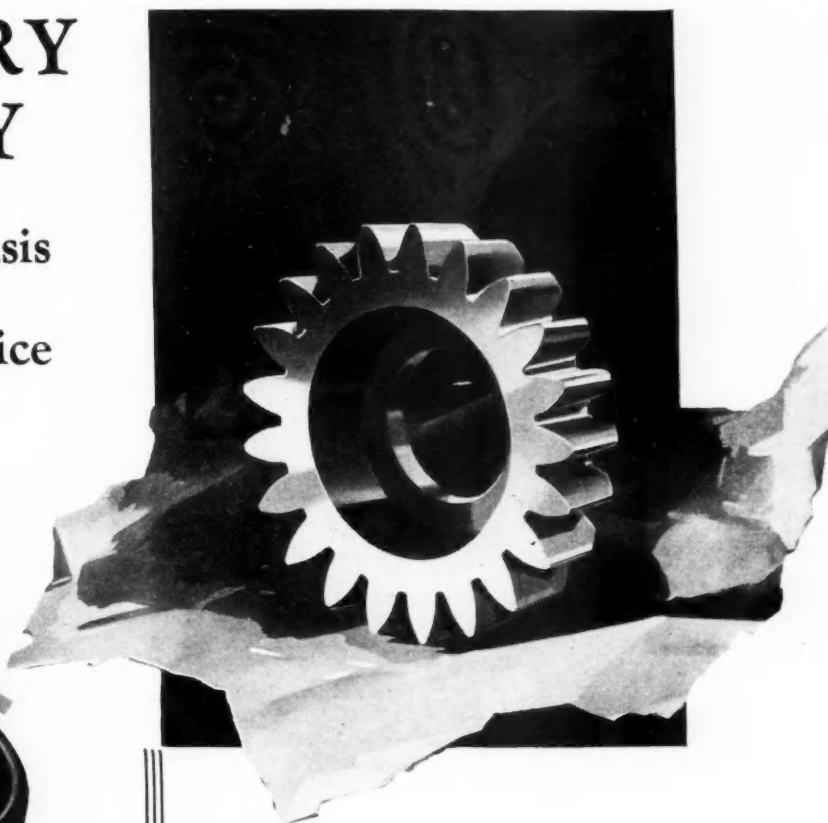
The drive of spindles and index mechanism are from a  $1\frac{1}{2}$  hp., 1750 r.p.m. motor mounted on a tilting plate inside the base of the machine. From the motor the drive is through a belt to the clutch on the rear top of machine. The clutch is operated from a foot treadle.

# LABORATORY ACCURACY

On a Production Basis  
at a Commercial Price



*Each Original Fellows Gear Shaper Cutter comes to you carefully packed in an individual metal box. It is a laboratory product and as such deserves the greatest protection.*



**M**ORE than thirty years of intensive laboratory research have been devoted towards perfecting the manufacture of Original Fellows Gear Shaper Cutters. During this period, the demands of industry have become more and still more exacting, with inevitable increases in manufacturing costs.

It has been possible to meet these demands only by developing special cutter manufacturing and inspecting equipment. \* \* \* This has been developed to such a high state of perfection that it is now possible to obtain laboratory accuracy on a production basis, and to sell this precision tool at a fair commercial price \* \* \*

Appreciating to the fullest extent that no product can be any more accurate than its inspection control, every effort has been exerted to produce testing equipment fundamentally correct in design for inspecting both the cutter and its product—these devices being so fool-proof in performance as to reduce the human factor to the minimum.

Users of Fellows products have at their command this highly developed inspection equipment. If for no other reason than this, you should standardize on Fellows products. As one user so tersely states: "Your cutters are consistently better and, once we know what we want, we know you can duplicate it exactly."

Any Fellows Sales Engineer is ready and willing to help you—why not give him the opportunity to serve you? Write: The Fellows Gear Shaper Company, Springfield, Vermont, (or Detroit Office, 616 Fisher Building).

# FELLOWS

## ~ GEAR SHAPERS ~

*Automotive Industries*

*July 4, 1931*

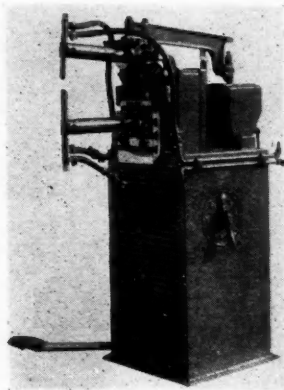


## NEW DEVELOPMENTS

### Automotive Parts, Accessories and Production Tools

#### Federal "Joule" Spot Welder

FOR the competitive low-price field, the Joule production spot welder with a capacity of 20 to 11-gage steel has been announced by the Federal Machine & Welder Co., Warren, Ohio. It is of all-steel welded construction with a fulcrumed swinging arm and available either foot or power operated or both.



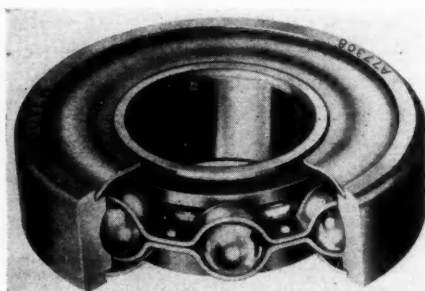
The motor is normally a  $\frac{1}{2}$  hp., constant torque, multi-speed motor, (4) speeds running at 1800, 1200, 900 and 600 r.p.m. A.C. current, three-phase, 60-cycle. This gives four welding speeds—60, 90, 120, 180 welds per minute. A constant speed motor giving about 100 welds per minute may be had if desired.

An improvement in air-cooled transformer design is featured in these machines, giving a maximum output in a small space. Coils are wound on the secondary of pure "Electrolitic" round-edged copper, insulated between turns with 0.025 in. thick fireproof insulation with sufficient overlap at edges to prevent "shorts" between turns. Capacities are 10 kw.—13 kv-a.; 12½ kw.—16.25 kv-a.; 15 kw.—19.5 kv-a.; 20 kw.—26 kv-a. (40 to 60-cycle inclusive).

Throat depths may be 10, 12, 14, 16, 18, 20, 22 and 24 in. as required.

#### Duoseal Bearing

A NEW bearing known as the Duoseal has been added recently to the line of the Hoover Steel Ball Co., Ann Arbor, Mich. It is a standard Hoover annular ball bearing with a stamped metal plate on each side of the raceway. These plates are fitted tight to the outer ring. The other edge of the plate fits a groove in the inner ring, allowing it to turn freely with the shaft and at the same time maintain an effective seal.



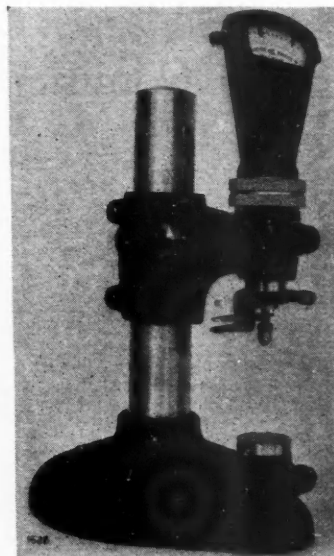
It is claimed that the Duoseal bearing is unusually effective in preventing leakage of grease to other parts of the machine where lubricants are detrimental to its operations, as well as assuring correct lubrication of the bearing by retaining the oil or grease within the raceways. The metal plates of the Duoseal bearing also exclude dirt.

#### Societe Genevoise Micro-Indicator Stand

THROUGH their American agents, the R. Y. Ferner Co., Investment Building, Washington, D. C., a new stand, Model U-3, for inspection purposes is being placed on the market by the Societe Genevoise d'Instruments de Physique of Geneva, Switzerland. It is designed for use with their fan-shaped micro-indicator in which a knife-edge multiplication system is employed.

The stand has an oval-shaped base approximately 10 in. long and 7½ in. wide at its widest point and rests on three rubber feet. The base and the other iron parts of the stand are finished in crystalline lacquer. A socket integral with the base is provided at the forward end which is bored accurately to a standard size to provide for the interchangeable mounting of different types of lower anvils or tables.

In the illustration is shown a table hardened and lapped optically flat. This is 1½ in. in diameter and is made with crossed grooves to make it easy to wring a standard flat-surfaced gage on the anvil in setting the instrument to zero before beginning readings. The stand is 13¼ in. high and weighs 32 lb.



#### Frew No. 1 Drill Press

RATED at maximum capacity of ½-in. drill, the No. 1 Frew drill press has been designed by the Frew Machine Co., Philadelphia, Pa., for accurate jig drilling and similar work. An important feature is that the work is moved to and from the drill instead of moving the spindle. The table is counterbalanced and is raised and lowered by means of the foot treadle, or a hand lever. Mounted on the column on a dovetailed way is a knee, which can be raised or lowered and locked in position to give the major adjustment between the spindle and the table. The table slide is quite long, and is furnished with a stop screw which can be set for the length of stroke desired. On the top of the column is mounted the head unit, which consists of two spindles running in ball bearings, each spindle fitted with a three-step cone, and the rear spindle fitted in addition with a driving pulley, which driving pulley is belted to the countershaft, running from a pair of idler pulleys.

This machine lends itself readily to direct motor drive, in which case the motor is mounted on the back of the head unit, taking the place of the back shaft, and the three-step cone is mounted on the motor shaft. Floor space required is 32 x 20 in. Net weight 680 lb.

